GE Medical Systems

Technical Publications

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Rev. 1

LOGIQ 9

CE 0459

Quick Guide

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Operating Documentation

Regulatory Requirement

GE Medical Systems

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Revision History

REV	DATE	REASON FOR CHANGE
0	November 1, 2001	Initial Release
1	November 14, 2002	R2.1.0 Release

List of Effective Page

PAGE NUMBER	REVISION HISTORY
Title	Rev. 1
A and B	Rev. 1
1-54	Rev. 1

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CAUTION FOR USA ONLY

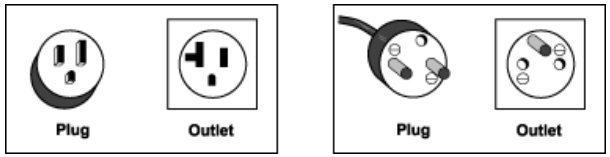
“United Sates law restricts this device to sale or use by or on the order of a physician” if sold in the United States.

System Power

Power On

To connect the system to the electrical supply:

1. Ensure that the wall outlet is of the appropriate type.



a b

Figure 1-1. Example Plug and Outlet Configurations

a. 100-120 VAC, 1200 VA Plug and Outlet Configuration
b. 220-240 VAC, 1200 VA Plug and Outlet Configuration

2. Ensure that the power switch is turned off.
3. Unwrap the power cable. Make sure to allow sufficient slack in the cable so that the plug is not pulled out of the wall if the system is moved slightly.
4. Attach the power plug to the system and secure it in place by using the retaining clamp.

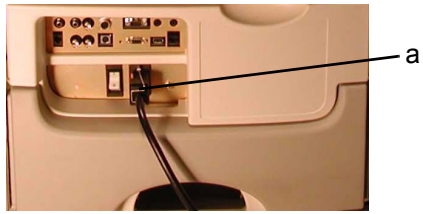


Figure 1-2. Power Plug

a. Retaining clamp for power plug

CAUTION: Ensure that the retaining clamp for the power plug is fixed firmly.

Use caution to ensure that the power cable does not disconnect during system use. If the system is accidentally unplugged, data may be lost.

Press the ***Power*** switch to turn the power on. The circuit breaker must also be in the on position.

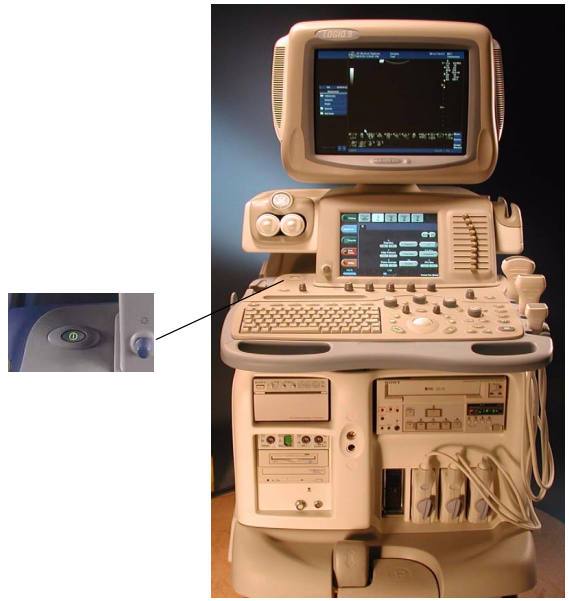
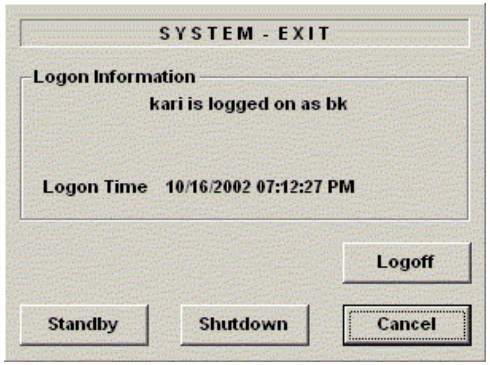


Figure 1-3. Power Switch Location

Power Off

To power down the system:

1. Press the ***Power*** switch at the front of the system once.
2. The System-Exit window is displayed.



3. Using the **Trackball** or ***Tab*** key, select Shutdown.

   The shutdown process takes about 30 seconds (the Power On light is green) and is completed when the control panel illumination is turned off (the Power On light is amber).
4. Disconnect the probes.

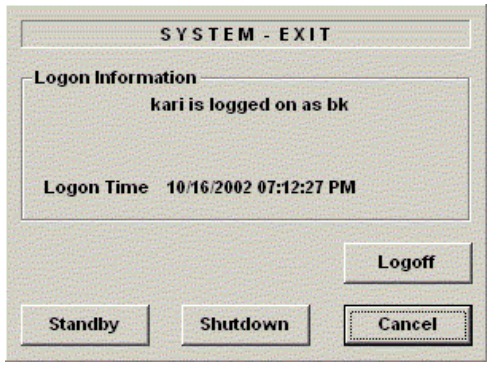
   Clean or disinfect all probes as necessary. Store them in their shipping cases to avoid damage.

Standby Mode

Standby Mode pauses the system without completely shutting down and restarting the system. This is particularly useful for portable exams.

To activate Standby Mode,

1. Press the Power switch.



2. Press Standby.

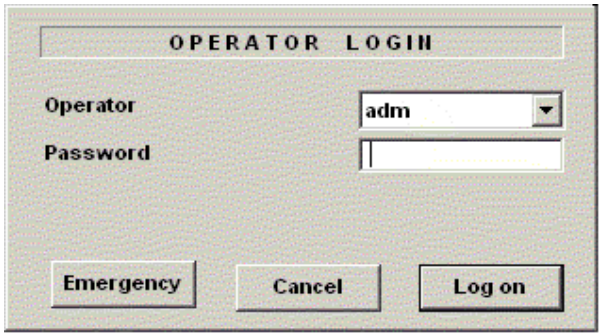
To exit Standby Mode, press the Power switch quickly and lightly.

NOTE: Standby Mode is available with a Processor Update.

Starting an Exam

You need to select a pre-configured dataflow that sets up the ultrasound system to work according to the services associated to the dataflow.

1. Select your Operator Login and type in your Password:



2. Press Log on.
3. Fill in the New Patient menu as described on Page 3.

   OR,

If the patient name is on the patient record list,

1. **Trackball** to the patient's name to highlight the name, (or perform a search to locate the patient) then press **Select Patient**.

Starting an Exam

New Patient

To start a new patient's exam,

1. Press Patient. Press the New Patient button on the Patient menu.
2. Select the Exam Category.
3. Type the Patient ID, Patient Name, Birthdate, etc.
4. Press the Register button on the Patient menu (DO NOT press Register if you are automatically generating a patient ID).
5. Press **Scan**, **B-Mode**, ***Esc***, or *Exit*. Select the probe from the Touch Panel.

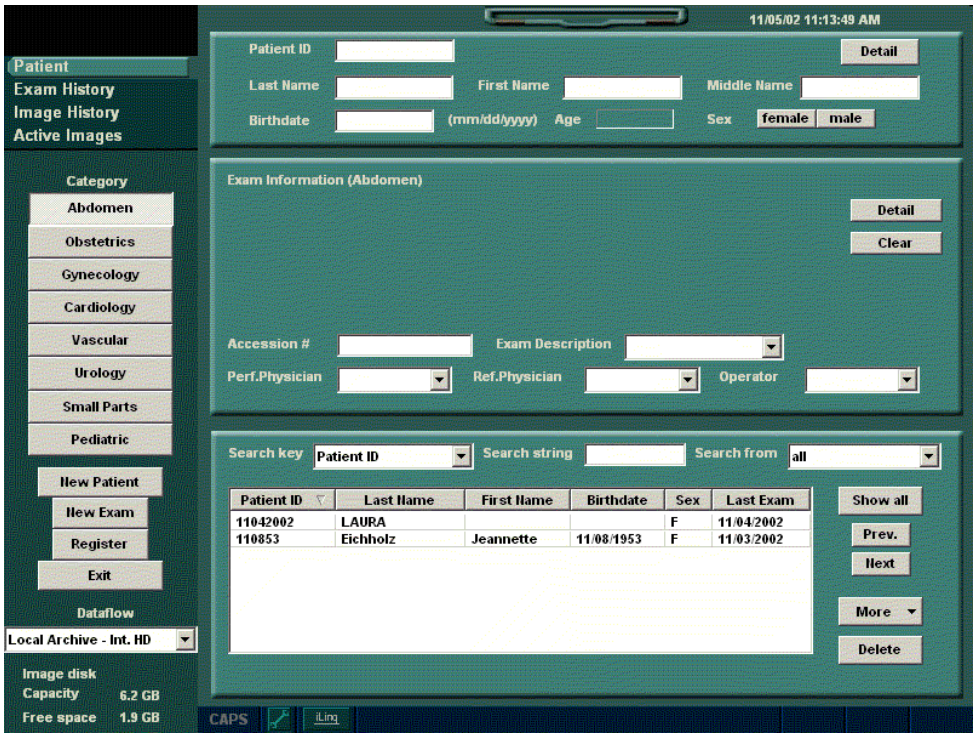
Probe Selection

Select a probe from the Touch Panel (the system automatically selects the last-used application for this probe).

Patient Entry Menu

Image Management Window [1]

Access to this patient's exam history and image management features.



Category Selection Window [2]

Select the appropriate exam application.

Function Selection Window [3]

New Patient is used to clear the patient entry screen to input a new patient's data into the database. *New Exam* is used to create a new exam on a current patient. *Register* is used to enter new patient information into the database prior to the actual exam being performed. *Exit* returns you to scanning.

Dataflow [4]

Selects this exam's dataflow preference.

Patient Information and **Detail Windows** [5]

Patient ID, Name, Birthdate, Age, Sex, Patient's Address, Telephone Number and Comments

Exam Information and **Detail Windows** [6]

Contains pertinent exam specific information.

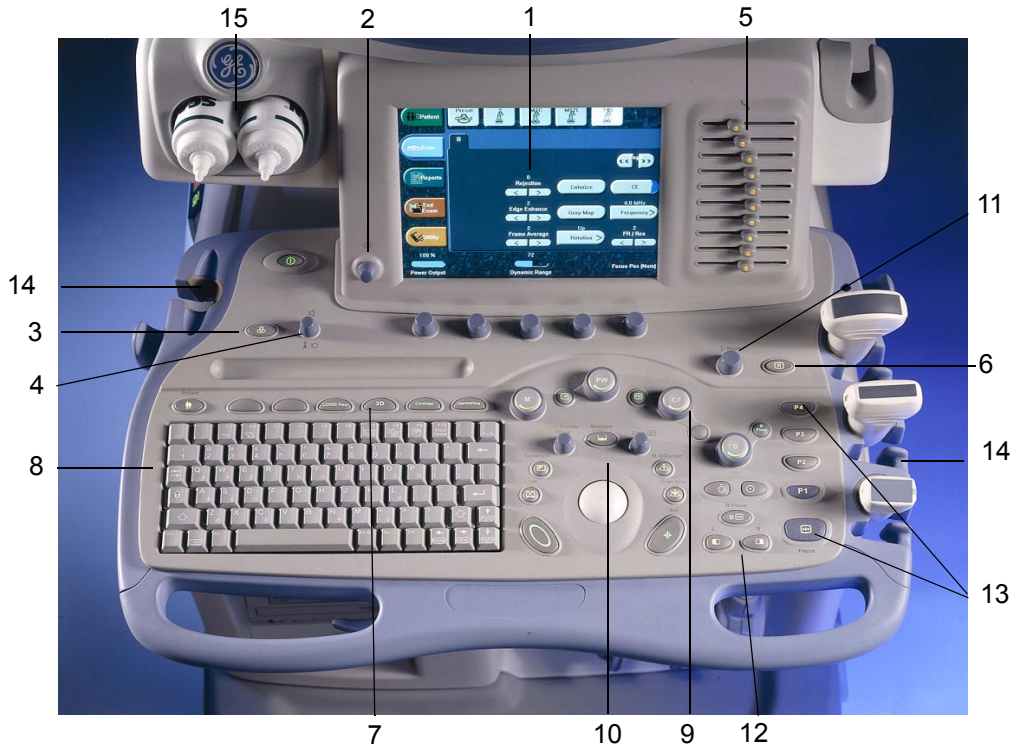
Patient List Window [7]

Lists the patients in the database. "Search key" enables searching list by Patient ID, Last Name, First Name, Birthdate, Sex and Last Exam date. "Search string" and "Search from" fields help define the search parameters. *More* gives you options like moving images and DICOM properties. *Delete* is use to remove the selected patient from the database.

LOGIQ 9 Control Panel Tour

1. Touch Panel. Touch the Touch Panel to adjust controls.

   At the bottom of the Touch Panel, there are five combination rotary dials/push buttons. The functionality of these keys changes, depending upon the currently displayed menu. Press the button to switch between controls (as with Focus Position/Number), or rotate the dial to adjust the value.
2. Touch Panel Brightness. Rotate to adjust.
3. Video. Press to control the VCR.
4. Audio Volume. Press to turn microphone on/off; rotate to adjust speaker volume.
5. TGC. Move slide pots left/right to adjust TGC.
6. Reverse. Press to invert the image left/right.
7. Additional Feature Keys. Patient, LOGIQView, 3D, Contrast, Harmonics. Press to activate these controls.
8. Keyboard. Use the keyboard to enter patient information and annotations.
9. Mode/Gain Keys: M Mode, Pulsed Wave Doppler (PW) Modes, Power Doppler Imaging (PDI) Mode, Color Flow (CF) Mode, B Mode, and B Flow. Press these key to activate the mode; rotate the key to adjust the Gain.
10. Imaging/Measurement Keys: Clear, Comment, Body Pattern, Ellipse, Measure, Zoom, M/D Cursor, Scan Area, Set. Press or rotate these keys, as necessary.
11. Depth. Rotate to adjust the Depth.
12. Imaging Feature Keys: Auto Optimize On/Off, B Pause, Multi Image Left/Right Select. Press these keys to activate/deactivate these functions.
13. Freeze and Print Keys. Press ***Freeze*** to freeze the image; press the ***P*** keys to archive, print, or send the image.
14. Probe Holder.
15. Gel Holder/Warmer.

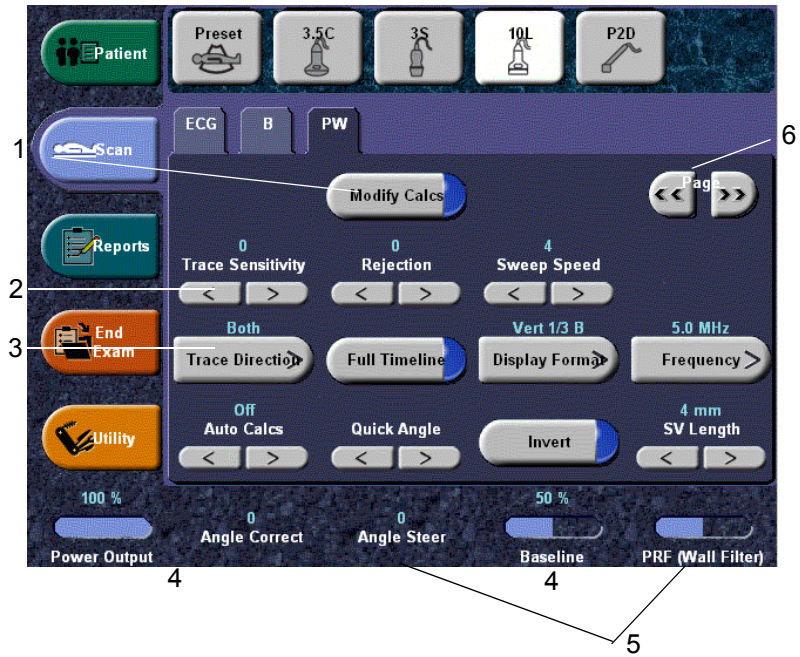


Control Panel/ Touch Panel Tour

LOGIQ 9 Touch Panel Tour

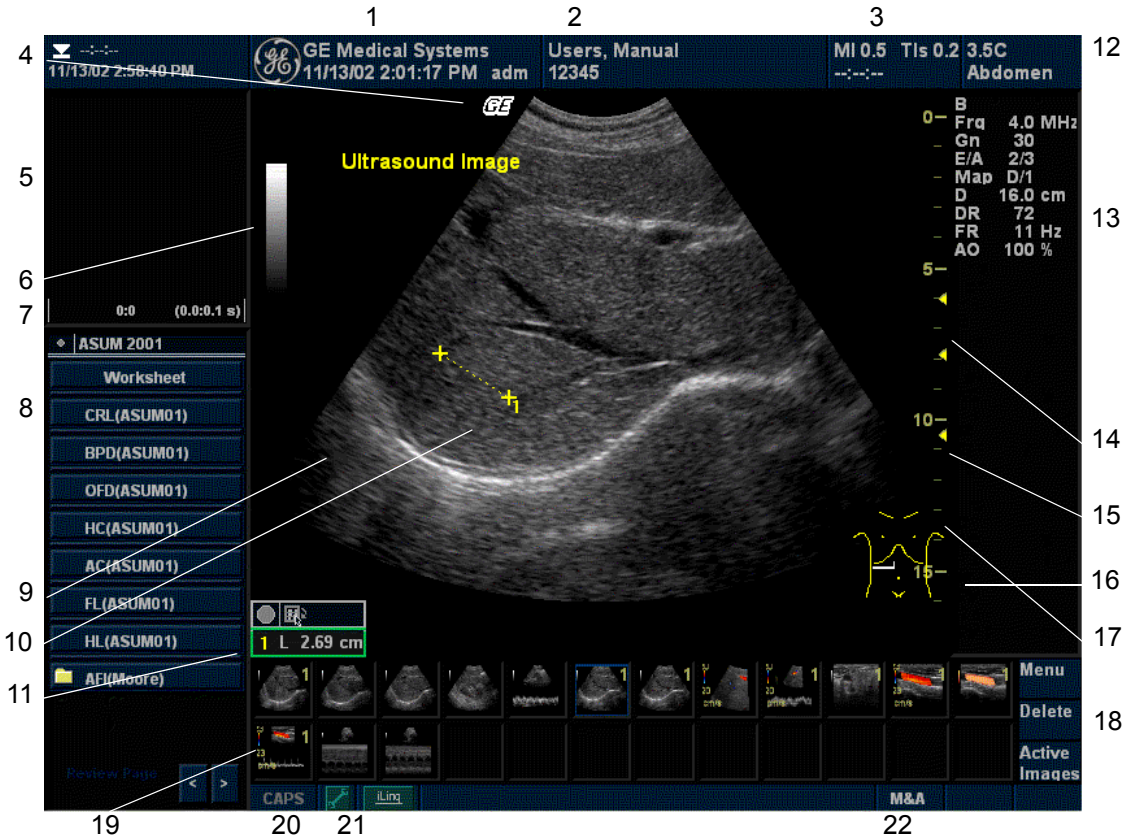
In general, the key status is indicated at the top of the key. There are different types of Touch Panel keys:

1. Press to toggle control on/off.
2. Progression keys are used to assess the impact of the control on the image progressively.
3. Progress/Select keys are used for controls that have three or more choices.
4. Rotate the knob below the Touch Panel to set values.
5. Press knob below the Touch Panel to select additional control, then rotate the knob to set values.
6. Press to move to the next Touch Panel page.



LOGIQ 9 Monitor Display Tour

1. Institution/Hospital Name, Date, Time, Operator Identification.
2. Patient Name, Patient Identification.
3. Acoustic Output Readout
4. GE Symbol (Probe Orientation Marker). The symbol is reversed on flipped images.
5. Image Preview, zoom reference box: .
6. Gray/Color Bar.
7. Cine Gauge. CINE frame/Total # of CINE frames (28/51), Frame time/total loop time.
8. Measurement Summary Window.
9. Image.
10. Measurement.
11. Measurement Results Window.
12. Probe Identifier. Exam Study.
13. Imaging Parameters by Mode.
14. Focal Zone.
15. TGC would display here if preset (not shown on the image).
16. Body Pattern.
17. Depth Scale.
18. Image Management Menu: Menu, Delete, and Active Images.
19. Image Clipboard.
20. Caps Lock: On or Off.
21. Service Browser icon (wrench), iLinq icon, and system messages display.
22. Trackball Functionality Status: Scroll, M&A (Measurement and Analysis), Position, Size, Scan Area Width and Tilt.



Control Panel/ Touch Panel Tour

B/M-Mode Image Optimize

Power Output

Optimizes image quality and allows user to reduce beam intensity. 10% increments between 0-100%. Values greater than 0.1 are displayed.

Dynamic Range

Dynamic Range controls how echo intensities are converted to shades of gray, thereby increasing the adjustable range of contrast.

Focus Number and Position

Increases the number of transmit focal zones or moves the focal zone(s) so that you can tighten up the beam for a specific area. A graphic caret corresponding to the focal zone position(s) appears on the right edge of the image.

NOTE: Push key to toggle between Focus Number and Focus Position.

Virtual Convex

On Linear and Sector probes, provides a larger field of view in the far field.

Rejection

Selects a level below which echoes will not be amplified (an echo must have a certain minimum amplitude before it will be processed).

Frame Average

Temporal filter that averages frames together. This has the effect of presenting a smoother, softer image.

Edge Enhance

Edge Enhance brings out subtle tissue differences and boundaries by enhancing the gray scale differences corresponding to the edges of structures. Adjustments to M Mode's edge enhancement affects the M Mode only.

Colorize

Enables gray scale image colorization. To deactivate, reselect a Gray Map.

Gray Map

Determines how the echo intensity levels received are presented as shades of gray.

Rotation (Up/Down)

Rotates the image by selecting the value from the pop up menu.

Coded Excitation (CE)

Improves image resolution and penetration in the far field.

Frequency

Multi Frequency mode lets you downshift to the probe's next lower frequency or shift up to a higher frequency.

Line Density

Optimizes B Mode frame rate or spatial resolution for the best possible image.

B Softener

Affects amount of lateral smoothing.

Suppression

Eliminates low-level echoes associated with acoustic/electrical noise.

B Flow Image Optimize

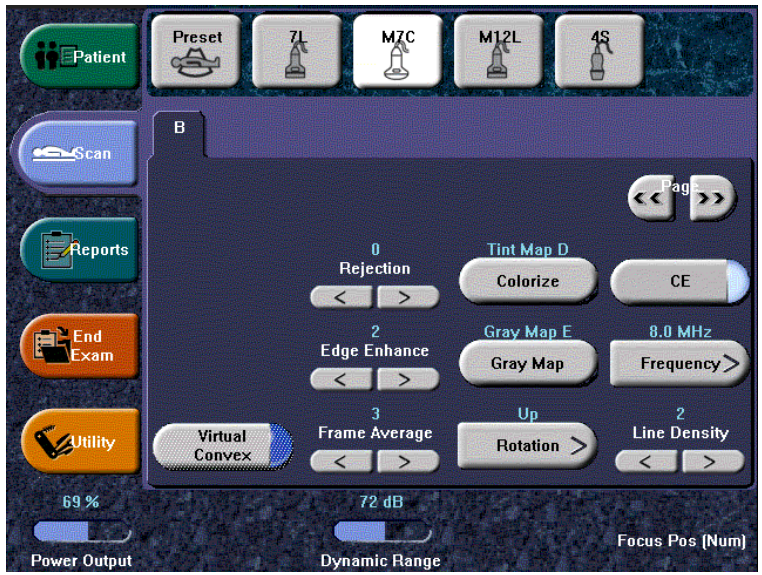
Provides intuitive representation of non-quantitative hemodynamics in vascular structures.

Sensitivity/PRI

Adjusts the sample rate for the flow signal.

Background On/Off

Background On views the anatomy roadmap; Background Off views flow information only.



B/M-Mode Image Optimize (continued)

Anatomical M Mode

Allows you to rotate or move the M line in order to image difficult-to-reach anatomy.

Sweep Speed

Changes the speed at which the timeline is swept.

Full Timeline

Expands display to full timeline display.

Display Format

Changes the horizontal/vertical display layout between B-Mode and M-Mode.

B-Mode Control Panel Controls

Auto Optimize

Automatic Tissue Optimization optimizes the image based upon a specified Region of Interest (ROI) or anatomy within the display.

Zoom

Magnifies a zoom region of interest, which is magnified to approximately the size of a full-sized image. An un-zoomed reference image is displayed adjacent to the zoom window. The system adjusts all imaging parameters accordingly. Press to activate/deactivate; rotate to increase/decrease zoom factor. Use the **Trackball** to position the Zoom ROI.

Reverse

Flips the image left/right. The GE symbol flips accordingly.

Multi Image

Press L to activate Multi Image; press R/L to toggle between live image.

B/M Mode Scanning Hints

Auto Optimize. Improves imaging performance while reducing optimization time.

Coded Harmonics. Enhances near field resolution for improved small parts and OB/GYN imaging as well as far field penetration.

B Flow. Provides a more intuitive representation of non-quantitative hemodynamics in vascular structure.

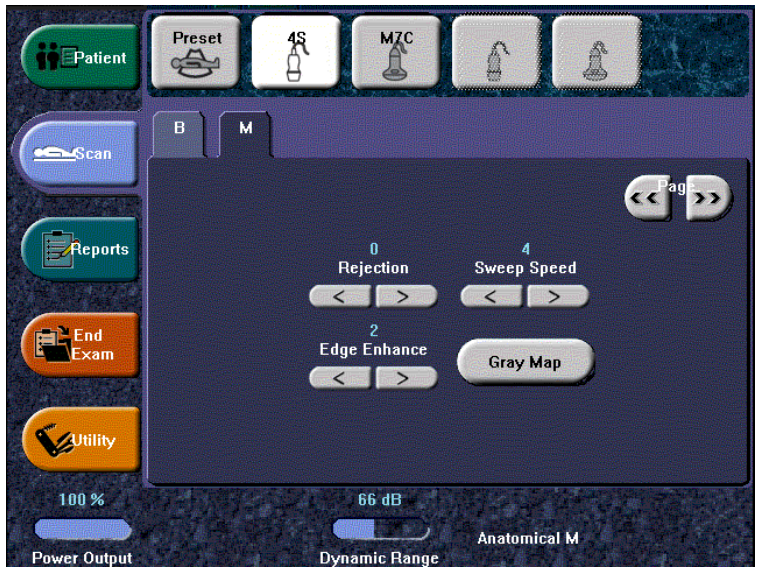
Frequency. Changes system parameters to best optimize for a particular patient type.

Maps. There is an inter-dependency between gray maps, gain, and dynamic range. If you change a map, revisit gain and dynamic range settings.

Dynamic Range. Affects the amount of gray scale information displayed.

Edge Enhance. Better delineates the amount of border sharpness.

Frame Average. Smooths the image by averaging frames. Affects the amount of speckle reduction.



Color Flow/PW Doppler Image Optimize

Angle Correct

Estimates the flow velocity in a direction at an angle to the Doppler vector by computing the angle between the Doppler vector and the flow to be measured.

Angle Steer/Fine Angle Steer

Angle Steer slants the Color Flow region of interest or the Doppler M line to obtain a better Doppler angle. Press Angle Steer to access Fine Angle Steer. Fine Angle Steer allows you to steer the Doppler cursor left/right 30 degrees in one degree ements. Available from the Doppler Mode Touch Panel.

Baseline

Adjusts the baseline to accommodate faster or slower blood flows to eliminate aliasing.

PRF/Wall Filter

Velocity scale determines pulse repetition frequency. If the sample volume gate range exceeds single gate PRF capability, the system automatically switches to high PRF mode. Multiple gates appear, and HPRF is indicated on the display.

Wall Filter insulates the Doppler signal from excessive noise caused from vessel movement.

NOTE: Push key to toggle between PRF and Wall Filter.

Threshold

Threshold assigns the gray scale level at which color information stops.

Map

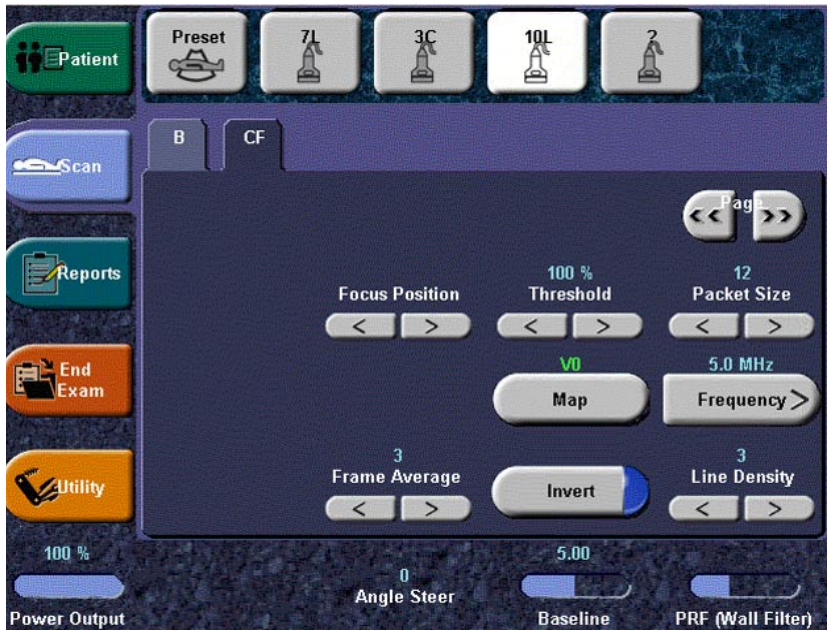
Allows a specific color map to be selected. After a selection has been made, the color bar displays the resultant map.

Invert

Allows blood flow to be viewed from a different perspective, i.e. red away (negative velocities) and blue toward (positive velocities). The real-time or frozen image can be inverted.

Packet Size

Controls the number of samples gathered for a single color flow vector.



Color Flow/PW Doppler Image Optimize (continued)

Modify Auto Calcs

Press to select desired Auto Calcs.

Trace Sensitivity

In Auto Calcs, increase to pick up more signal or decrease to pick up less signal.

Trace Direction

Select Above, Below, or Both.

Auto Calcs

Specify Auto Calcs On/Live/Frozen.

Quick Angle

Quickly adjusts the angle by 60 degrees.

Sample Volume Gate Length

Sizes the sample volume gate.

Trace Method

Specify Max, Mean, or Off.

Duplex

Duplex on: simultaneous B-Mode and PW Mode; Duplex off: toggle live B-Mode and PW via B Pause.

PW/CF Ratio

Adjusts the ratio between Spectral Doppler and Color Flow.

Compression

Increase to make frozen image appear more contrasty; decrease to make frozen image appear softer.

Time Resolution

Lower makes the image appear smoother; higher makes the image appear sharper.

Color Flow Control Panel Control

Scan Area. Toggles between the CFM ROI window size and position.

M/D Cursor. Activates the Doppler cursor.

Scanning Hints

Line Density. Trades frame rate for sensitivity and spatial resolution. If the frame rate is too slow, reduce the size of the region of interest, select a different line density setting, or reduce the packet size.

Wall Filter. Affects low flow sensitivity versus motion artifact.

To improve sensitivity. Increase Gain, decrease PRF, increase Power Output, adjust Line Density, decrease Wall Filter, increase Frame Averaging, increase Packet Size, reduce ROI to the smallest reasonable size, and position the Focal Zones properly.

To decrease motion artifact. Increase the PRF, and increase the Wall Filter.

To eliminate aliasing. Increase the PRF and lower the Baseline.

For venous imaging. Ensure that you have selected the vascular exam category, select a venous application, select the appropriate probe for very superficial structure, select two focal zones, adjust the depth to the anatomy to be imaged, maintain a low gain setting for gray scale, activate Color Flow, maintain the PRF at a lower setting, and increase Frame Averaging for more persistence.

Color Flow/Doppler Mode Image Optimize

Basic Measurements

*NOTE: The following instructions assume that you first scan the patient and then press **Freeze**.*

Distance and Tissue Depth Measurements

1. Press ***Measure*** once; an active caliper displays.
2. To position the active caliper at the start point (distance) or the most anterior point (tissue depth), move the ***Trackball***.
3. To fix the start point, press ***Set***. The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point (distance) or the most posterior point (tissue depth), move the ***Trackball***.
5. To complete the measurement, press ***Set***. The system displays the distance or tissue depth value in the measurement results window.

NOTE: Before you complete a measurement:

*To toggle between active calipers, press **Measure**.*

*To erase the second caliper and the current data measured and start the measurement again, press **Clear** once.*

*NOTE: To rotate through and activate previously fixed calipers, turn **Cursor Select**.*

*NOTE: After you complete the measurement, to erase all data that has been measured to this point, but not data entered onto worksheets, press **Clear**.*

Circumference/Area (Ellipse) Measurement

1. Press ***Measure*** once; an active caliper displays.
2. To position the active caliper, move the ***Trackball***.
3. To fix the start point, press ***Set***. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper, move the ***Trackball***.
5. Turn the ***Ellipse*** control; an ellipse with an initial circle shape appears.

NOTE: Be careful not to press the Ellipse control as this activates the Body Pattern.

6. To position the ellipse and to size the measured axes (move the calipers), move the ***Trackball***.
7. To increase the size, turn the ***Ellipse*** control in a clockwise direction. To decrease the size, turn the ***Ellipse*** control in a counterclockwise direction.
8. To toggle between active calipers, press ***Measure***.
9. To complete the measurement, press ***Set***. The system displays the circumference and area in the measurement results window.

NOTE: Before you complete a measurement:

*To erase the ellipse and the current data measured, press **Clear** once. The original caliper is displayed to restart the measurement.*

*To exit the measurement function without completing the measurement, press **Clear** a second time.*

Circumference/Area (Trace) Measurement

1. Press ***Measure*** twice; a trace caliper displays.
2. To position the trace caliper at the start point, move the ***Trackball***.
3. To fix the trace start point, press ***Set***. The trace caliper changes to an active caliper.
4. To trace the measurement area, move the ***Trackball*** around the anatomy. A dotted line shows the traced area.

*NOTE: To erase the dotted line but not the trace caliper, press **Clear** once. To clear the trace caliper and the current data measured, press **Clear** twice.*

*NOTE: To erase the line (bit by bit) back from its current point, move the **Trackball** or turn the **Ellipse** control counterclockwise.*

5. To complete the measurement, press ***Set***. The system displays the circumference and the area in the measurement results window.

NOTE: Before you complete a measurement:

To erase the line (bit by bit) back from its current point, move the Trackball or turn the Ellipse control counterclockwise.

To erase the dotted line but not the trace caliper, press Clear once.

To clear the trace caliper and the current data measured, press Clear twice.

Volume

1. To make a volume calculation, do one of the following:

- Make one distance measurement.
- Make two distance measurements.
- Make three distance measurements.

  NOTE: Three distances should be done in the dual format mode (side by side images). One measurement is usually made in the sagittal plane and two measurements in the axial plane.

- Make one distance and one ellipse measurement.
- Make one ellipse measurement.

2. Select ***Volume***.

Time Interval Measurement

1. Press ***Measure*** twice; and active caliper with a vertical dotted line displays.
2. To position the active caliper at the start point, move the ***Trackball***.
3. To fix the start point, press ***Set***. The system fixes the first caliper and displays a second active caliper.
4. To position the second caliper at the end point, move the ***Trackball***.
5. To complete the measurement, press ***Set***. The system displays the time interval between the two calipers in the measurement results window.

Velocity Measurement

1. Press ***Measure***; an active caliper with a vertical dotted line displays.
2. To position the caliper at the desired measurement point, move the ***Trackball***.
3. To complete the measurement, press ***Set***. The system displays the velocity measurement in the measurement results window.

PI, RI, S/D Ratio, D/S Ratio or A/B Ratio

Select **PI**, **RI**, **S/D Ratio**, **A/B Ratio** or **D/S Ratio** from the Doppler Touch Panel. Perform velocity measurements.

1. The first caliper is the start point on the Doppler waveform. This would be V_{MAX} for PI, peak velocity for RI, systole for S/D ratio, "A" velocity for A/B ratio or diastole for D/S ratio.
2. The second caliper is the end-point caliper to the end point of the Doppler waveform. This would be V_d for PI, minimum velocity for RI, diastole for S/D ratio, "B" velocity for A/B ratio or systole for D/S ratio.

NOTE: For the PI calculation, if Trace Auto is not selected, manually trace the waveform between V_{MAX} and V_d.

NOTE: For the PI calculation, if Trace Auto is on, the system automatically traces the waveform when Set is pressed to fix V_d.

Worksheets

Measurement/Calculation worksheets are available to display and edit measurements and calculations. There are generic worksheets as well as Application specific worksheets. The worksheets are selected from the Measurement Touch Panel.

Reports

This feature is not currently available.

Using Probes

Connecting a probe

1. Place the probe's carrying case on a stable surface and open the case.
2. Carefully remove the probe and unwrap the probe cable.
3. DO NOT allow the probe head to hang free. Impact to the probe head could result in irreparable damage.
4. Turn the connector locking handle clockwise.
5. Align the connector with the probe port and carefully push into place.
6. Turn the connector locking handle clockwise to secure the probe connector.
7. Carefully position the probe cable in the probe cord holder spot so it is free to move, but not resting on the floor.

Activating the probe

Select the appropriate probe from the probe indicators on the Touch Panel.

The probe activates in the currently-selected operating mode. The probe's default settings for the mode and selected exam are used automatically.

Deactivating the probe

When deactivating the probe, the probe is automatically placed in standby mode.

1. Press the ***Freeze*** key.
2. Gently wipe the excess gel from the face of the probe.
3. Carefully slide the probe around the right side of the keyboard, toward the probe holder.

   Ensure that the probe is placed gently in the probe holder.

Disconnecting the probe

Probes can be disconnected at any time. However, the probe should not be selected as the active probe.

1. Move the probe locking handle counterclockwise. Pull the probe and connector straight out of the probe port.
2. Carefully slide the probe and connector away from the probe port and around the right side of the keyboard. Ensure the cable is free.
3. Be sure that the probe head is clean before placing the probe in its storage box.

Table 1-1: Probe Indications for Use

Probe Application	3.5C	M7C	E8C	8C	7L	10L	M12L	4S	10S	i12L
Abdomen	X	X	X	X	X	X		X	X	
Small Parts				X	X	X	X		X	X
Periph. Vasc.					X	X	X			X
OB/GYN	X	X	X		X	X		X		
Pediatrics		X		X	X	X	X		X	X
Neonatal				X		X	X		X	
Urology	X	X	X				X	X		
Surgery							X			X
Endocavity			X							
Transcranial										

Probe Features

Table 1-2: Probe Features

Probe Feature	3.5C	M7C	E8C	8C	7L	10L	M12L	4S	10S	i12L
Coded Excitation		X	X	X		Available in Abdominal and OB/GYN			X	
Coded Harmonics	X	X	X	X	X	X	X	X	X	X
B-Flow	X	X	X	X	X	X	X			X
Coded Contrast	X	X			X	X	X			
LOGIQ View	X	X	X	X	X	X	X	X	X	X
Virtual Convex					X	X	X	X	X	X
Easy 3D	X	X	X	X	X	X	X	X	X	X
Advanced 3D	X	X	X	X	X	X	X	X	X	X
Tru3D Magnetically Tracked (3D Sensor Based)	X	X	X			X	X	X		
Anatomical M Mode	X	X	X					X	X	
M Color Flow	X	X								
TruAccess	X	X	X	X	X	X	X	X	X	X
Multi-Level Codes	CHI and Contrast Coded PI	Contrast Coded PI			Contrast Coded PI	Fund in Sm Pts and PV	Fund and CHI in Sm Pts, PV, and Ped	Fund and CHI and Contrast Coded PI		
Biopsy	X	X	X		X	X	X	X		

Probe Cleaning and Disinfection Instructions

Probe Safety

WARNING

Ultrasound probes are highly sensitive medical instruments that can easily be damaged by improper handling. Use care when handling and protect from damage when not in use. DO NOT use a damaged or defective probe. Failure to follow these precautions can result in serious injury and equipment damage.

Ultrasound transducers can easily be damaged by improper handling and by contact with certain chemicals. Failure to follow these precautions can result in serious injury and equipment damage.

- Do not immerse the probe into any liquid beyond the level specified for that probe. Never immerse the transducer connector or probe adapters into any liquid.
- Avoid mechanical shock or impact to the transducer and do not apply excessive bending or pulling force to the cable.
- Transducer damage can result from contact with inappropriate coupling or cleaning agents:
  - Do not soak or saturate transducers with solutions containing alcohol, bleach, ammonium chloride compounds or hydrogen peroxide
  - Avoid contact with solutions or coupling gels containing mineral oil or lanolin
  - Avoid temperatures above 60°C.
  - Inspect the probe prior to use for damage or degeneration to the housing, strain relief, lens and seal. Do not use a damaged or defective probe.

Biological Hazard

CAUTION

Adequate cleaning and disinfection are necessary to prevent disease transmission. It is the responsibility of the equipment user to verify and maintain the effectiveness of the infection control procedures in use. Always use sterile, legally marketed probe sheaths for intra-cavitary and intra-operative procedures.

For neurological intra-operative procedures, use of a legally marketed, sterile, pyrogen free probe sheath is REQUIRED. Probes for neuro surgical use must not be sterilized with liquid chemical sterilants because of the possibility of neuro toxic residues remaining on the probe.

A defective probe or excessive force can cause patient injury or probe damage:

- Observe depth markings and do not apply excessive force when inserting or manipulating intercavity probes.
- Inspect probes for sharp edges or rough surfaces that could injure sensitive tissue.

In order for liquid chemical germicides to be effective, all visible residue must be removed during the cleaning process. Thoroughly clean the probe, as described on the following page before attempting disinfection.

CREUTZFIELD-JACOB DISEASE
Neurological use on patients with this disease must be avoided. If a probe becomes contaminated, there is no adequate disinfecting means.

Electrical Hazard

The probe is driven with electrical energy that can injure the patient or user if live internal parts are contacted by conductive solution:

- **DO NOT** immerse the probe into any liquid beyond the level indicated by the immersion level diagram. Never immerse the probe connector or probe adaptors into any liquid.
- **DO NOT** drop the probes or subject them to other types of mechanical shock or impact. Degraded performance or damage such as cracks or chips in the housing may result.
- Inspect the probe before and after each use for damage or degradation to the housing, strain relief, lens, and seal. A thorough inspection should be conducted during the cleaning process.
- **DO NOT** kink, tightly coil, or apply excessive force on the probe cable. Insulation failure may result.
- Electrical leakage checks should be performed on a routine basis by GE Service or qualified hospital personnel. Refer to the service manual for leakage check procedures.

Probe Cleaning, After Each Use

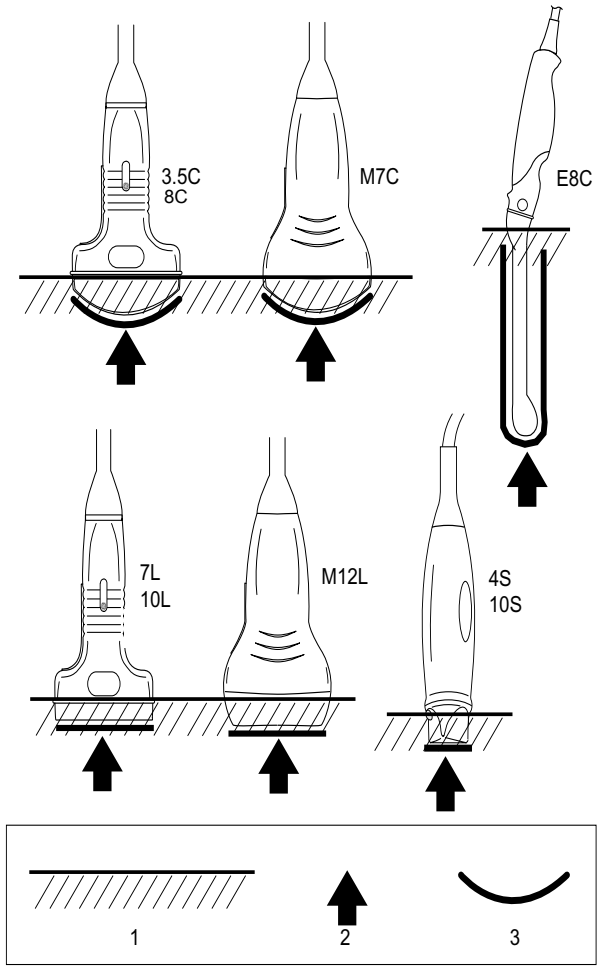
1. Disconnect probe from ultrasound console and remove all coupling gel from probe by wiping with a soft cloth and rinsing with flowing water.
2. Wash the probe with mild soap in lukewarm water. Scrub the probe as needed using a soft sponge, gauze, or cloth to remove all visible residue from the probe surface. Prolonged soaking or scrubbing with a soft bristle brush (such as a toothbrush) may be necessary if material has dried onto the probe surface.
3. Rinse the probe with enough clean potable water to remove all visible soap residue.
4. Air dry or dry with a soft cloth.

Probe Disinfection, After Each Use

1. Prepare the germicide solution according to the manufacturer's instructions. Be sure to follow all precautions for storage, use and disposal.
2. Place the cleaned and dried probe in contact with the germicide for the time specified by the germicide manufacturer. High-level disinfection is recommended for surface probes and is required for endocavitary and intraoperative probes (follow the germicide manufacturer's recommended time).

   Probes for neuro surgical intra-operative use must NOT be sterilized with liquid chemical sterilants because of the possibility of neuro toxic residues remaining on the probe. Neurological procedures must be done with the use of legally marketed, sterile, pyrogen free probe sheaths.
3. After removing from the germicide, rinse the probe following the germicide manufacturer's rinsing instructions. Flush all visible germicide residue from the probe and allow to air dry.

Probe Immersion Levels



1. Fluid Level
2. Aperture
3. Contact face within patient environment

Probe Disinfection Agents

The following high level disinfectant agents have been approved for use with all probes:

- Cidex OPA
- Cidex

Cidex Plus has been approved for the 8C probe.

Sporox II high level disinfectant has been approved for the 7L, 10L, 12L, 4S, 8C, and E8C probes.

Pera Safe high level disinfectant has been approved for the 7L, 10L, 12L, M7C, M12L, and E8C probes.

The following low level disinfect agents have been approved for use with all probes:

- Ster Bac Blu
- Sani-Cloth HB (Wipes)

T-Spray and T-Spray II low level disinfectant has been approved for the 7L, 10L, 12L, M7C, M12L, 4S, and E8C probes.

Virex II 256 low level disinfectant has been approved for the 7L, 10L, 12L, M7C, M12L, and E8C probes.

Image Management

Clipboard

As images are saved by pressing any of the print keys (P1, P2, P3, or P4), the images appear at the bottom of the display on the clipboard as thumbnails of the images saved during the exam. These images remain on the clipboard until the end of the exam.

Printing Images

Press the appropriate print key (P1, P2, P3, or P4). For more information on programming the Print buttons, See “Buttons” on page 21.

Browsing an Exam’s Stored Images

‘Mouse over’ the image in the clipboard, then press *Set* to view an enlarged thumbnail image.

Managing an Exam’s Stored Images

From the Display, press Active Images; from the New Patient menu, open Active Images.

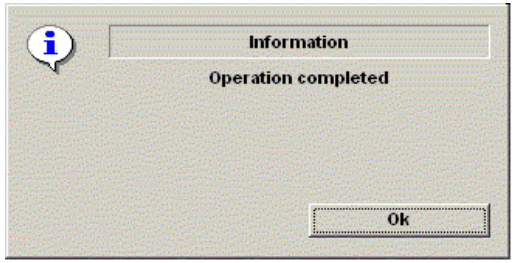
Deleting an Image

Select the image on the clipboard, then press the onscreen Delete shortcut.

Or, go to **Active Images** (lower, right-hand portion of the display). Highlight all the images that need to be deleted and press **Delete All Temp Images** from the Touch Panel

Formatting a CD/MOD

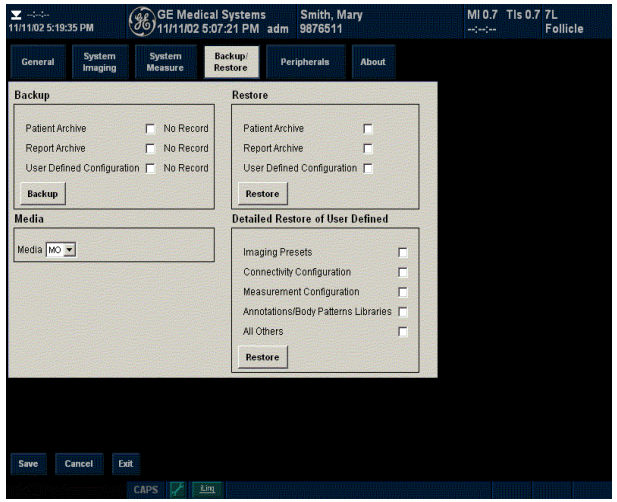
1. Insert the backup media. Format the backup media, CD-ROM or MOD. Select the Utility tab on the Touch Panel. Select Connectivity, then Tools. Label the media appropriately. Press Format.
2. The Ultrasound system displays a pop-up menu when the formatting has been completed. Press *Ok* to continue. Verify that the format was successful.



Backing Up Patient Information

Format a CD/MOD prior to following these steps.

1. Select the Utility tab on the Touch Panel. Select System, then Backup/Restore.



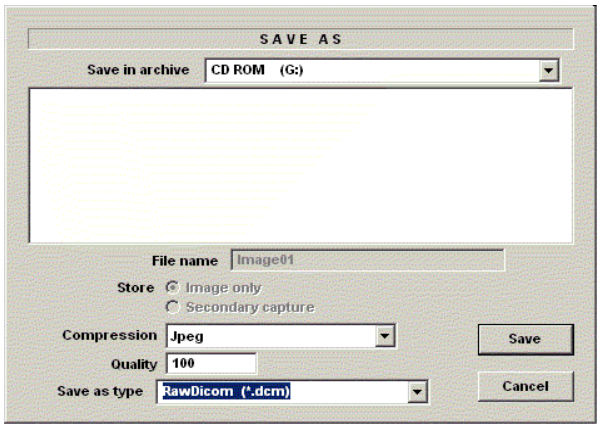
2. Select everything under Backup by placing a check mark in front of Patient Archive, Report Archive, and User Defined Configuration. Then press Backup.
3. Answer ‘Ok’ to the Back-Up pop-up message as many times as the number of items you are backing up.

NOTE: The detailed section of this menu decouples the user defined configuration above. This allows you to selectively restore what you want to restore across multiple machines.

Saving Images as JPEG files and CINE Loops as AVI files

Format a CD/MOD prior to following these steps.

1. Press Menu (on the lower, right-hand portion of the display) and select *Save As*. The SAVE AS menu appears.



2. Specify Compression and Save As Type and press *Save*. The image is saved to the CD/MOD.
3. When you have saved all the images you want on the CD/MOD, remove the media (press ***F3*** to eject the CD-ROM).

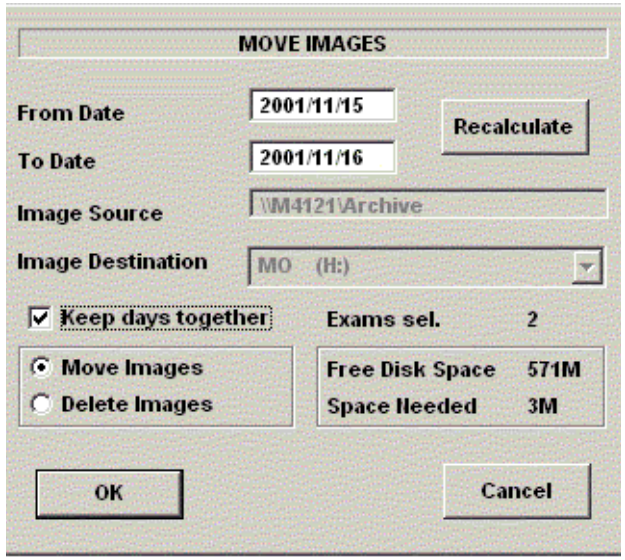
4. Finalize the CD by selecting *Yes*. The CD-ROM is ejected from the system.

NOTE: If you want to add more images to the CD, select "No" and do not finalize the CD.

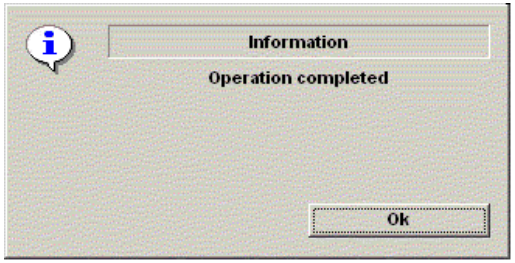
Moving (Archiving) Images

Format a CD/MOD prior to following these steps.

1. Insert the backup media. Press *Patient*. Press *More*, then select *Move Images*. The Move Images pop-up appears.



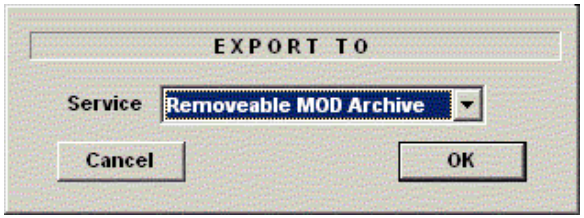
2. Fill in the From Date, then press *Recalculate*. Specify to Keep days together. Check that you have enough disk space for the images you want to move. If not, revise the move criteria. Select *Move Images*, then press *OK*. An in-progress message appears. The archive operation is complete when you receive this message.



Exporting Patient Data

Format a CD/MOD prior to following these steps.

1. Press *Patient*. Deselect any selected patient(s) in the search portion of the Patient screen. Press *More* (located at the lower, right-hand corner of the Patient menu).
2. Select *Export*. Specify the type of removable media (MOD or CD-ROM) on the Export pop-up. Press *OK*. Then, please wait until the Patient menu is visible.



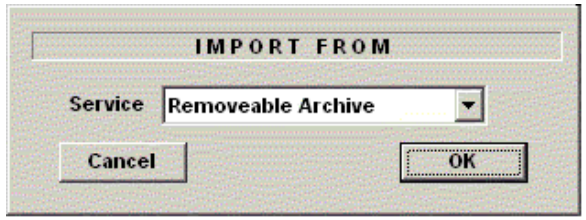
3. In the patient list at the bottom of the Patient menu, select the patient(s) you want to export.

   NOTE: You can use Windows commands to select more than one patient.

   NOTE: You need to use your best judgment when moving patients' images. If there are lots of images or loops, then only move a few patients at a time.
4. Once you have selected all of the patients to export, press *Copy Patient* from the Select All/ Copy Patient Menu.
5. Informational status messages appear as the copy is taking place. A final status report pop-up message appears. Press *OK*.
6. Press ***F3*** to eject the CD or press the MOD eject button. Specify that you want to finalize the CD-ROM.

Importing Patient Data/Images

1. At another Ultrasound system, insert the MOD or CD-ROM.
2. Press *Patient*, press *More*, then *Import*. The Import From pop-up message appears. Press *OK*.



3. The Patient menu just shows the patients available for import from the removable media you just loaded onto the system.
4. Select the patients to be imported.
5. Press *Copy Patient* from the Select All/Copy Patient menu.
6. Please wait for the patient information to be copied to this Ultrasound system. Informational messages appear while the import is taking place.
7. Press F3 to eject the media.

Connectivity

Connectivity on the LOGIQ 9 is based on the Dataflow concept.

Dataflow Concept

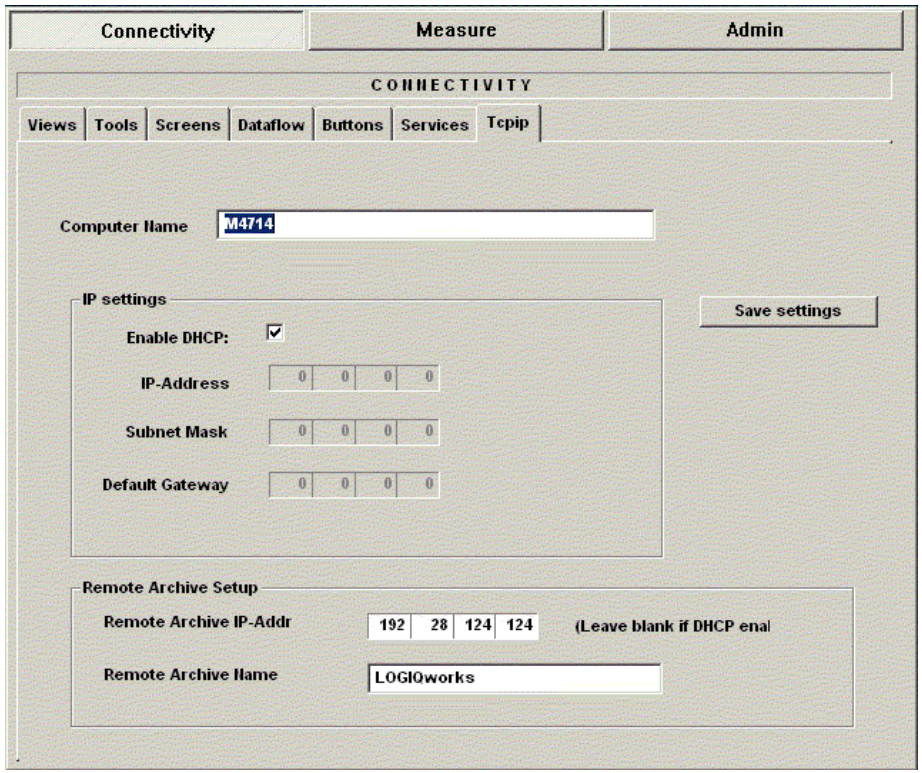
A dataflow is a set of pre-configured services. For example, DICOM services may be for storage, worklist, verify, etc. In addition, there are other service types like video print, standard color print, storage to local hard drive, select patient from local database, etc.

Configuring Connectivity

Login as Administrator. Press the left Utility tab. Select the Connectivity tab. Configure the menus from right to left, starting with TCP/IP first.

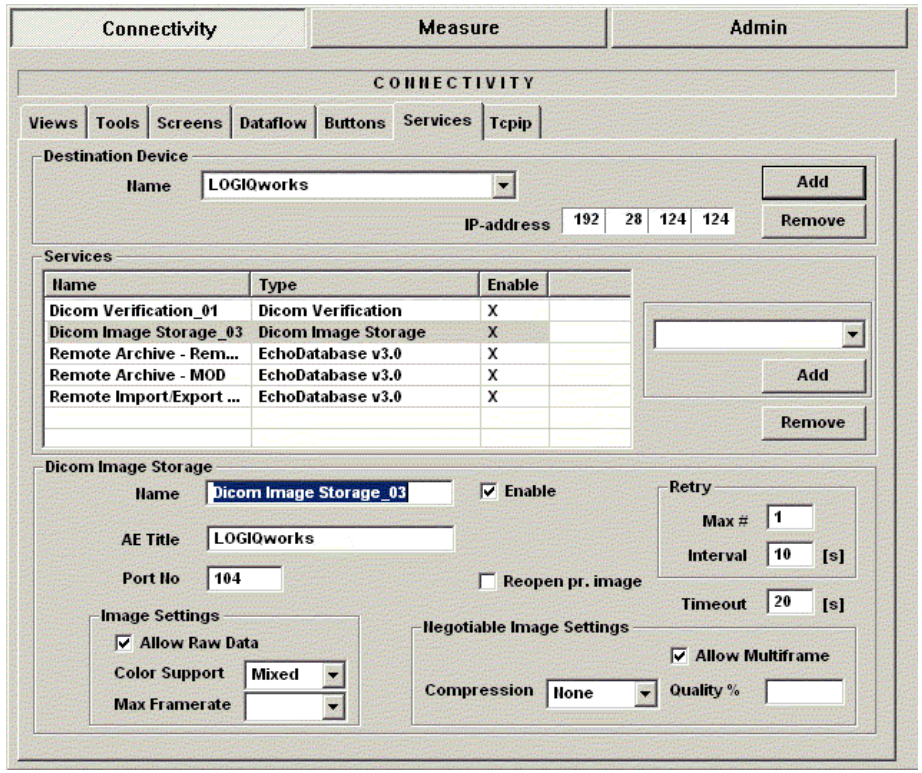
TCP/IP

Type in the Computer's Name (better known as the AE Title). Identify the Ultrasound system to the rest of the network by filling in its IP Address, Subnet Mask, and Gateway (if applicable). Press **Save**.



Services (better known as Destinations)

1. Select the Server from the pull-down menu.
2. Press *Add*.
3. Select all the services for this device from the pull-down menu to the right.
4. Press *Add*.
5. At the bottom of the menu, fill in the appropriate criteria for this service. Repeat this step for each selected service for this device.



Buttons

You can assign print buttons (P1-P4) to a device or to a dataflow.

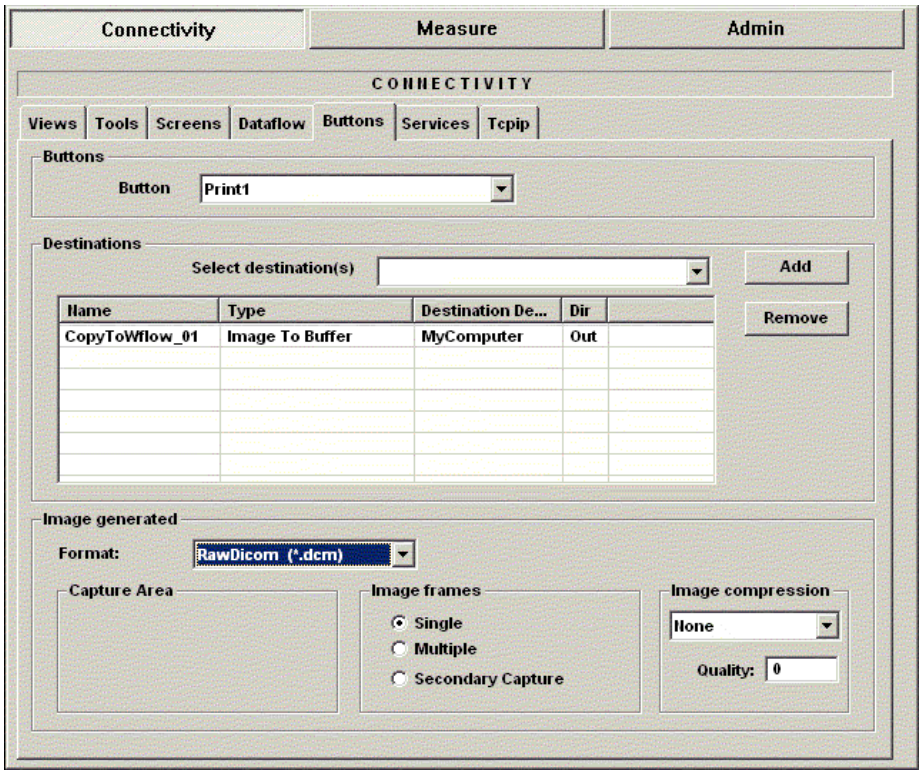
NOTE: You can configure each print key to multiple output devices/workflows.

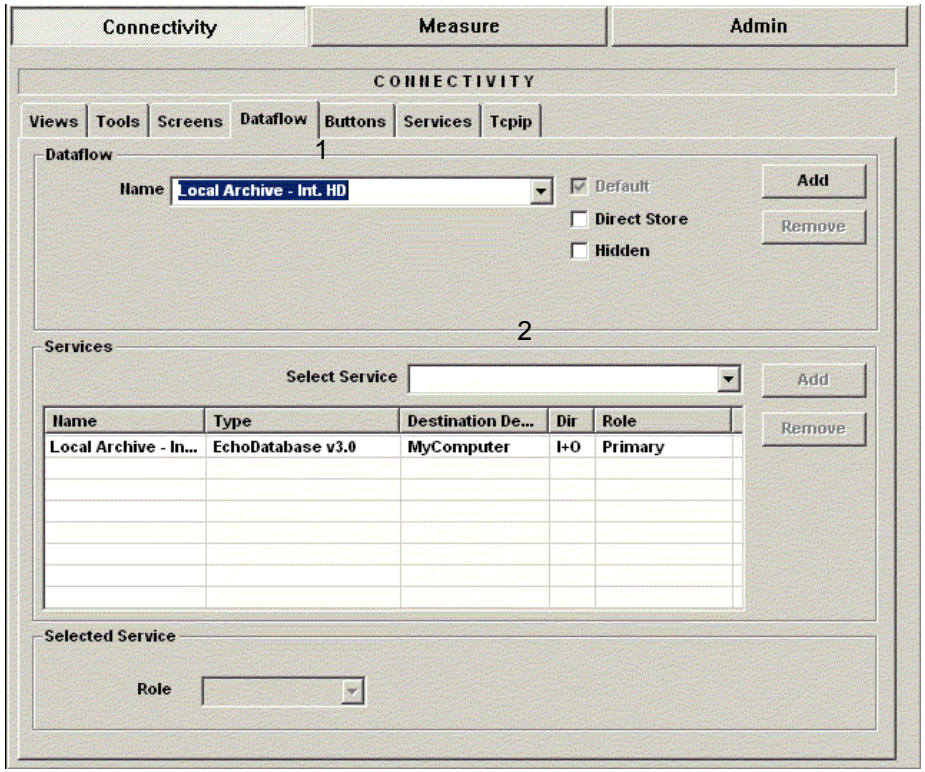
Dataflow

Creates a Dataflow, ('WL-LA-DServ -- Worklist, Local Archive, DICOM Server, for example).

1. Name the Dataflow (select from pull-down menu or add a new dataflow).
2. Configure the flow in the Services section of the screen. Select the Service from the pull-down menu and press *Add*.

NOTE: Remember to specify each service Role as Primary or Secondary. The primary service specifies what always happens first to incoming or outgoing data. Only one primary role is available.





Verifying a Device

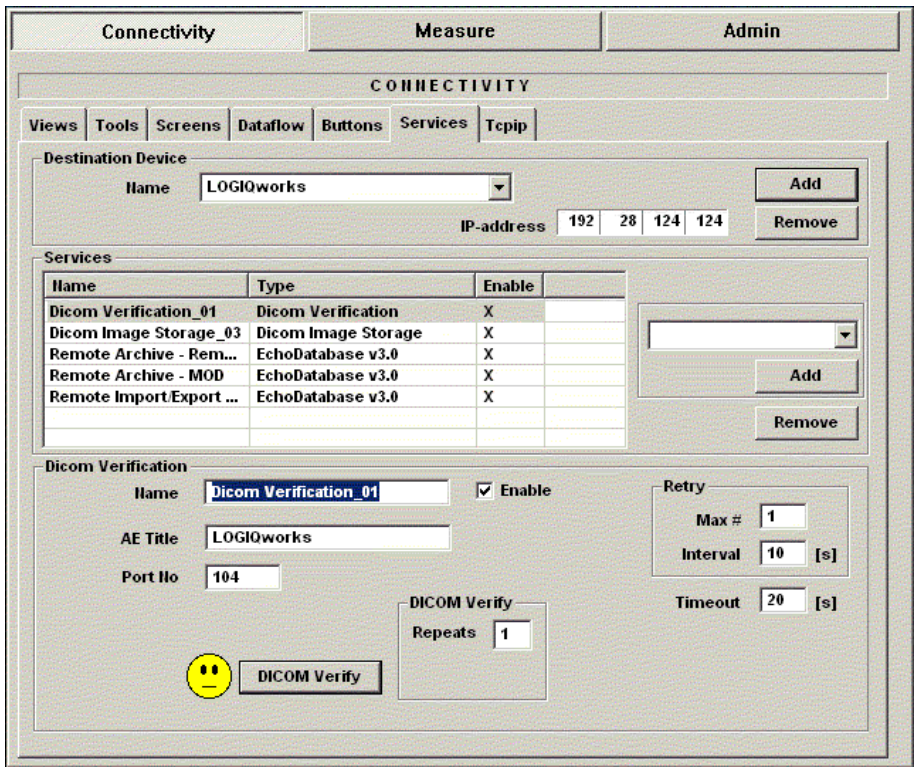
Select the device, press **DICOM Verify**.

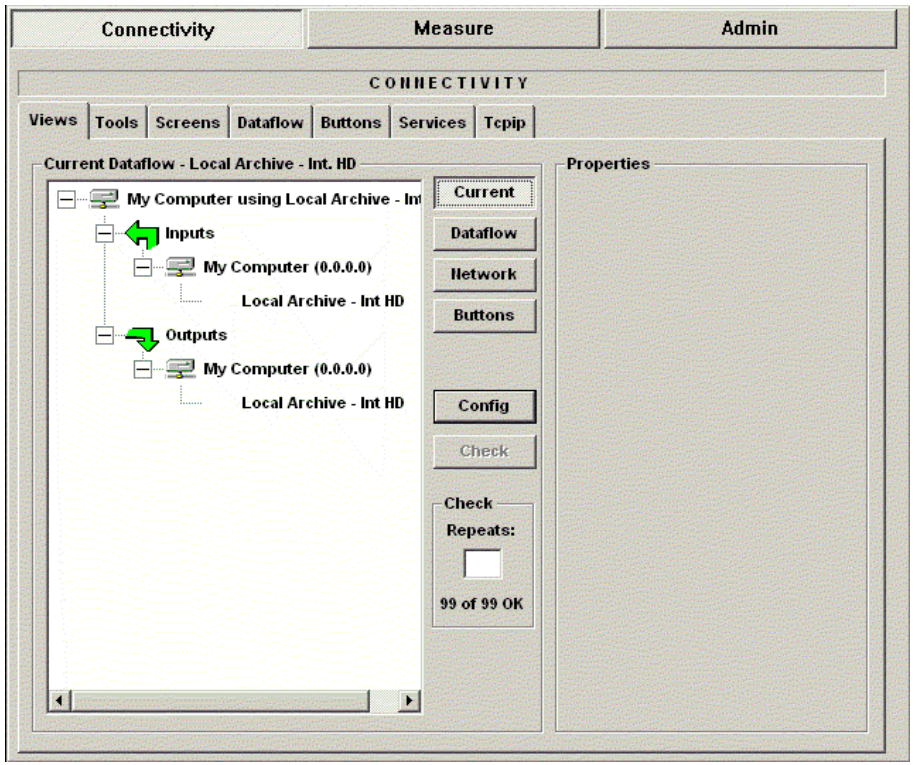
Views

Views a snapshot of this ultrasound system's connectivity architecture (onboard network + external network + dataflows).

Pinging a Device (DICOM Echo)

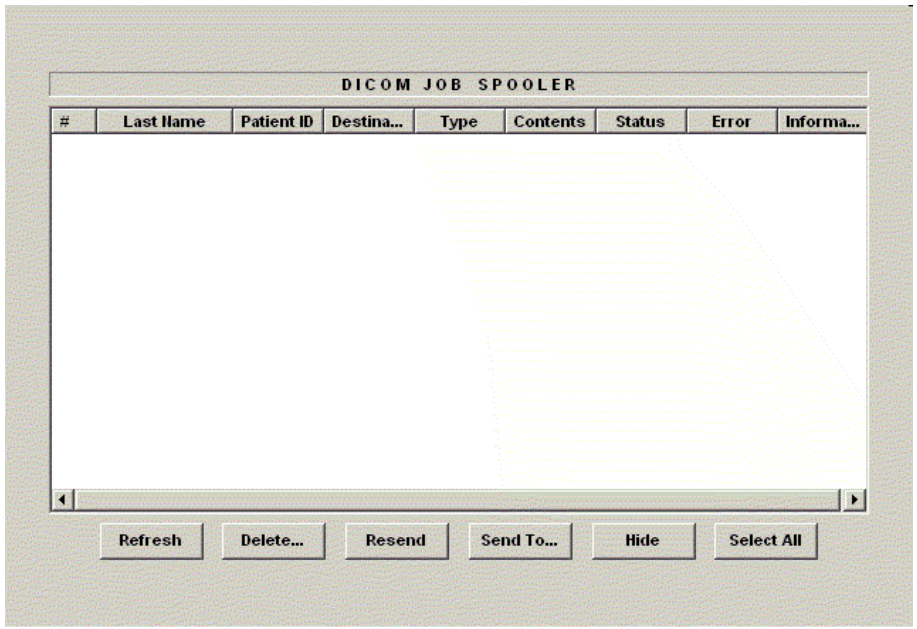
Select the device, press **Check**.





DICOM Status

To check the status of all DICOM jobs or redirect DICOM jobs, press ***F4***.



Using CINE

Activating CINE

Press **Freeze**, then roll the **Trackball** to activate CINE. To start CINE Loop playback, press Run/Stop. To stop CINE Loop playback. press Run/Stop.

To activate Timeline CINE, press **Freeze**, press **Scan Area**, then roll the **Trackball** to activate CINE.

Quickly Move to Start/End Frame

Press ***First*** to move to the first CINE frame; press ***Last*** to move to the last CINE frame.

Start Frame/End Frame

Turn the ***Start Frame*** dial to the left to move to the beginning of the CINE Loop. Turn the dial to the right to move forward through the CINE Loop.

Turn the ***End Frame*** dial to the right to move to the end of the CINE Loop. Turn the dial to the left to move backward through the CINE Loop.

Adjusting the CINE Loop Playback Speed

Turn the ***Loop Speed*** dial clockwise/counter-clockwise to increase/decrease the CINE Loop playback speed.

Disconnecting B-Mode CINE from Timeline CINE

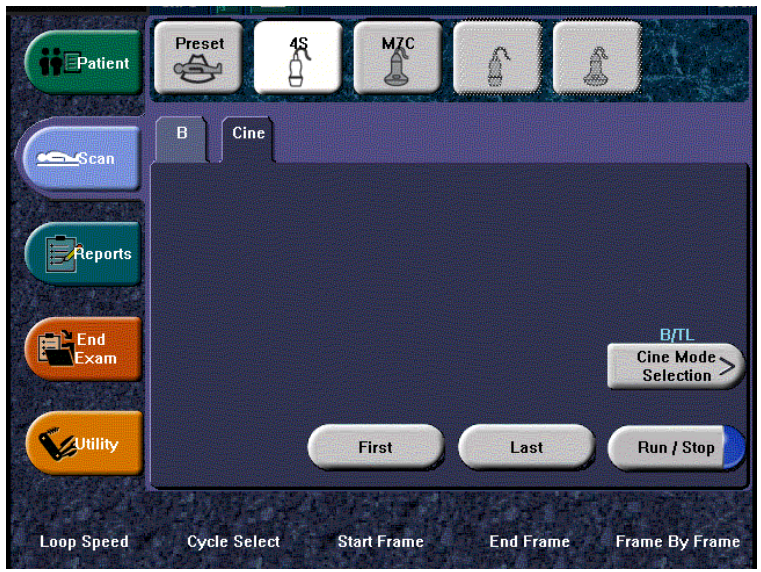
To review the B-Mode CINE Loop only, press ***Cine Mode Selection*** and select ***B Only***.

To review the Timeline CINE Loop only, press ***Cine Mode Selection*** and select ***TL Only***.

To return to linked B-Mode and Timeline CINE Loop review, press ***Cine Mode Selection*** and select ***B/TL***.

Moving through a CINE Loop Frame By Frame

Turn ***Frame by Frame*** to move through CINE memory one frame at a time.



Easy 3D

Acquiring a 3D Scan

1. Optimize the B-Mode image. Ensure even gel coverage.
2. Press the **3D** control panel key. Two screens appear.
3. To start acquiring the 3D image, press '**L**' (the left split screen key).
4. To perform a parallel scan, scan evenly. To perform a sweep (fan) scan, rock the probe once. Note the distance of the scan.
5. The 3D volume of interest is generated on the right side of the screen in real time.

NOTE: If the image stops before you're done scanning, start acquiring the 3D volume of interest again.

6. To stop the 3D scan, press '**R**' (the right split screen key).

Manipulating the 3D Scan

Imagine you are able to manipulate the 3D volume of interest (VOI) in your hand.

You can rotate it left to right or right to left. You can rotate it forward/backward (white hand).

Then, imagine that you can view the volume of interest one slice at a time through the anatomy (red hand).

Also imagine that you are able to pull back tissue to view specific portions of anatomy (yellow and green hands).

The 3D volume of interest is a tangible anatomical object that you can see and manipulate easily using the **Trackball** and **Set** control panel keys.

Practice positioning the pointer at different places within the 3D volume of interest. Highlight different colors, press **Set** to select this volume for manipulation. Use the hand to move the 3D volume.

Adjusting the 3D Volume of Interest

You can colorize the 3D volume of interest.

You can resize the VOI by adjusting the scan distance.

Performing a Surface Render

From the 3D Touch Panel, press ***3D***, then press ***Texture*** on the next Touch Panel to add a photorealistic/clay-like quality to the render.

Adjust the opacity and density via ***Threshold/ Opacity*** (press the key to adjust opacity). This adjusts what 'grays' the system recognizes, allowing you to emphasize/de-emphasize grays as necessary.

Scalpel

To cut away portions of the anatomy,

1. Press ***Scalpel***. A caliper appears on the 3D VOI.
2. Press **Set** to set the caliper. **Trackball** around the portion to be cut away.
3. Double click and apply the scalpel.
4. Change the projection and scalpel again.

NOTE: You can undo one scalpel, then check apply on side of monitor.

3DView Scanning Hints

Set the appropriate values for the 3D Acq Mode and Scan Plane.

It is advisable to set the scan distance before the scan begins.

Contact Information

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Clinical Questions

For information in the United States, Canada, Mexico and parts of the Caribbean, call the Customer Answer Center:
TEL: (1) 800-682-5327 or (1) 262-524-5698

In other locations, contact your local Applications, Sales or Service Representative.

Service Questions

For service in the United States, call GE CARES
TEL: (1) 800-437-1171

Accessories Catalog Requests

To request the latest GE Accessories catalog or equipment brochures in the United States, call the Response Center: TEL: (1) 800-643-6439

In other locations, contact your local Applications, Sales or Service Representative.

Placing an Order

To place an order, order supplies or ask an accesory-related question in the United States, call the GE Access Center: TEL: (1) 800-472-3666

In other locations, contact your local Applications, Sales or Service Representative.

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Paperless Documentation

Introduction

Documentation is being provided via:

- Release Notes (supplied on paper)
- Quick Guide (supplied on paper)
- Online Help (on the Ultrasound Scanner via F1)
- CD-ROM. You can view user documentation on a PC or on the Ultrasound Scanner via the Customer Documentation CD-ROM, which includes:
  - Basic User Manual
  - Advanced Reference Manual
  - Quick Guide
  - Quick Card(s)
  - Release Notes and Workarounds
  - Basic Service Manual

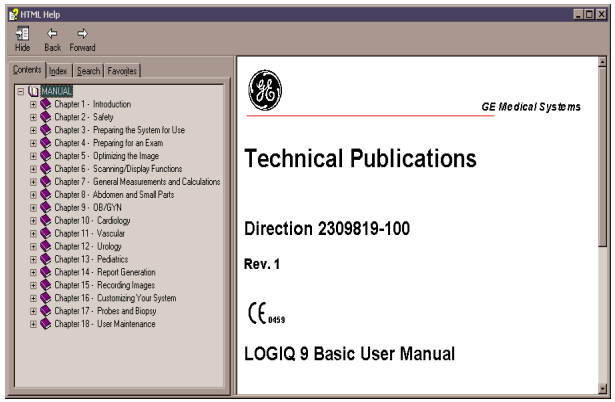
NOTE: All user documentation is provided in multiple languages on the CD-ROM.

Using Online Help Via F1

Online Help is available via the F1 key.

The Help screen is divided into three sections:

- navigational tools on the top, left portion of the screen (Hide, Back, Forward)
- help book navigational tools on the left portion of the screen (Contents, Index, Search, Favorites)
- content portion on the right side of the screen where help topics are displayed



Navigating Through Help

Online Help is organized like a manual, with individual chapters, sections, and pages.

Click on the plus (+) sign next to MANUAL to open up the book.

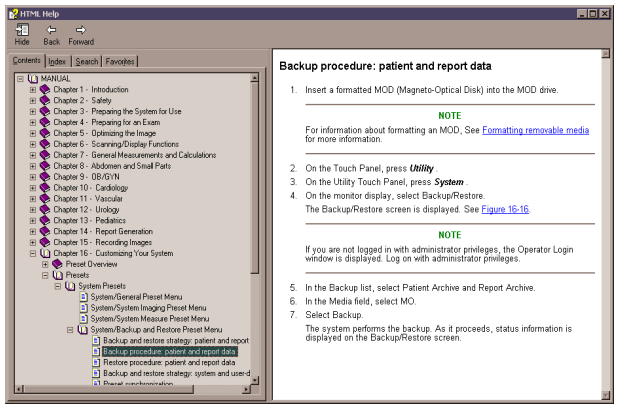
Click on the plus sign next to the chapter you want to view to open up that chapter.

Click on the plus sign next to the chapter you want to view to open up that section.

Click to open up the page to view that page's information.

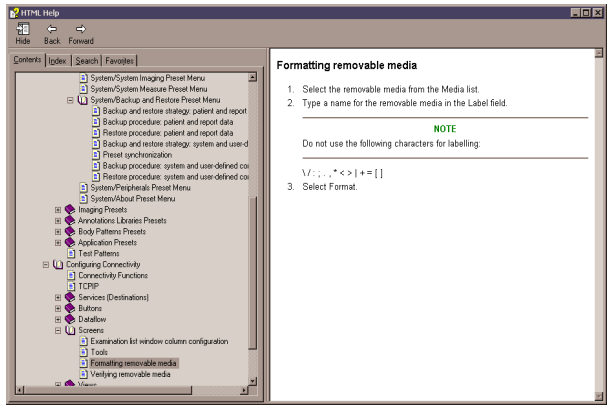
The blue, underlined text links you to related topics. Click on the link to move to the new topic.

To go back to the previous screen, press Back. To return to the link, press Forward.


HTML Help
Hide
Back
Forward
Contents
Index
Search
Favorites
Backup procedure: patient and report data
1. Insert a formatted MOD (Magneto-Optical Disk) into the MOD drive.
NOTE
For information about formatting an MOD, See Formatting removable media for more information.
2. On the Touch Panel, press Utility.
3. On the Utility Touch Panel, press System.
4. On the monitor display, select Backup/Restore.
The Backup/Restore screen is displayed. See Figure 16-16.
NOTE
If you are not logged in with administrator privileges, the Operator Login window is displayed. Log on with administrator privileges.
5. In the Backup list, select Patient Archive and Report Archive.
6. In the Media field, select MO.
7. Select Backup.
The system performs the backup. As it proceeds, status information is displayed on the Backup/Restore screen.

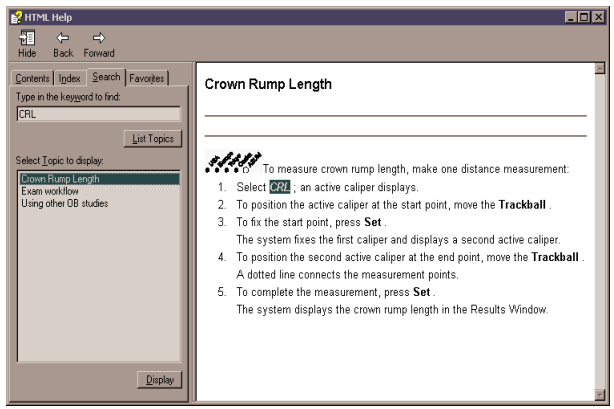
Help Links

After you click on a blue, underlined portion of text, the screen updates with this link's content.



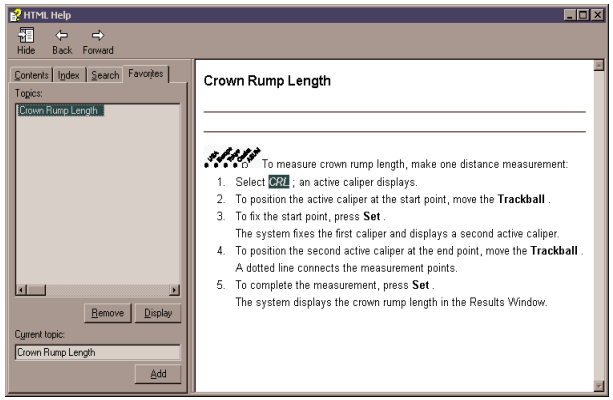
Searching for a Topic in Help

To search for a specific topic, click on the Search tab. Type in the topic name in the *Type in the keyword to find:* field. Topics with the word or phrase you typed appear in the *Select Topic to display:* area. Either double click on the topic you want to view or highlight the topic and press the Display button to view this topic.


HTML Help
Hide
Back
Forward
Contents
Index
Search
Favorites
Type in the keyword to find:
CRL
List Topics
Select Topic to display:
Crown Rump Length
Exam workflow
Using other OB studies
Display
Crown Rump Length
To measure crown rump length, make one distance measurement:
1. Select CRL ; an active caliper displays.
2. To position the active caliper at the start point, move the Trackball .
3. To fix the start point, press Set .
The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the Trackball .
A dotted line connects the measurement points.
5. To complete the measurement, press Set .
The system displays the crown rump length in the Results Window.

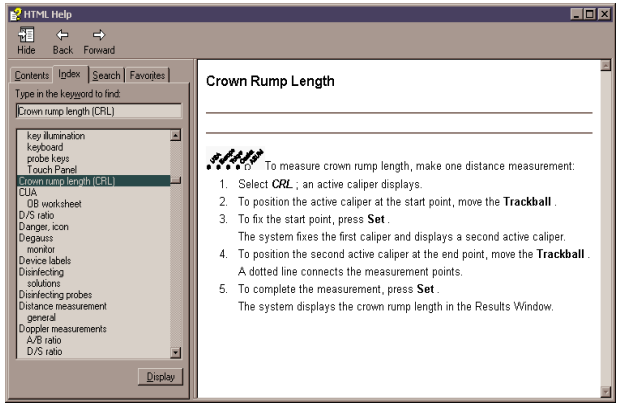
Creating a List of Favorite Topics in Help

You may find that there are topics you need to refer to often. In this case, it's a good idea to save these topics as Favorites. To save a topic as a favorite, press the Favorites tab, highlight the topic in the Topics window, and press the Add button. You can now view this topic quickly by going to the Favorites help tab.


HTML Help
Hide
Back
Forward
Contents
Index
Search
Favorites
Topics:
Crown Rump Length
Remove
Display
Current topic:
Crown Rump Length
Add
Crown Rump Length
To measure crown rump length, make one distance measurement:
1. Select CRL ; an active caliper displays.
2. To position the active caliper at the start point, move the Trackball .
3. To fix the start point, press Set .
The system fixes the first caliper and displays a second active caliper.
4. To position the second active caliper at the end point, move the Trackball .
A dotted line connects the measurement points.
5. To complete the measurement, press Set .
The system displays the crown rump length in the Results Window.

Using the Help Index

Or, you can look for topics by using the Index. Press the Index tab, then use the scroll bar to look up a topic.



Other Help Features

To hide the left side of the screen, press the Hide icon at the upper, left-hand portion of the screen. To view the left side of the screen again, press the Show icon at the upper, left-hand portion of the screen.

To size the Help window, position and hold down the cursor at the corner of the screen while moving the Trackball.

To move the Help window to the Touch Panel display, position and hold down the cursor at the very top of the Help window while moving the Trackball to the Touch Panel display.

Exiting Online Help

To exit Online Help, press the 'X' in the upper, right-hand corner of the Online Help window.

Accessing Documentation Via a PC

To view user documentation on a PC,

1. Insert the CD into the CD drive.
2. Open the CD drive on your desktop.
3. Double click on the ‘gedocumentation.html’ document.
4. Select the item you want to view (click on the blue, underlined link in the File Name column).

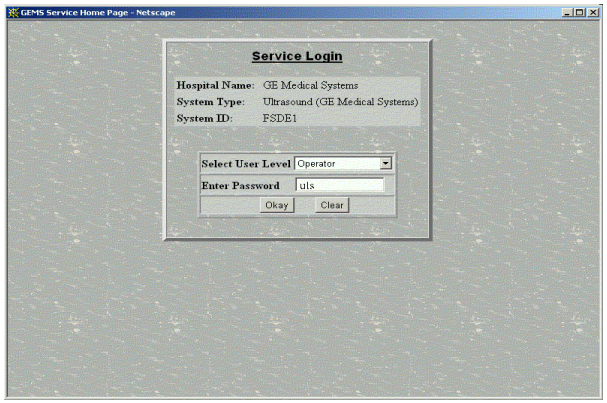
To close the window, click on the ‘X’ in the upper, right-hand corner of the browser window.

NOTE: If your PC does not have the Adobe Acrobat Reader, the PC version is supplied on the CD. Open the CD and double click on ‘ar505enu.exe. Follow the prompts to install Adobe Acrobat Reader on your PC.

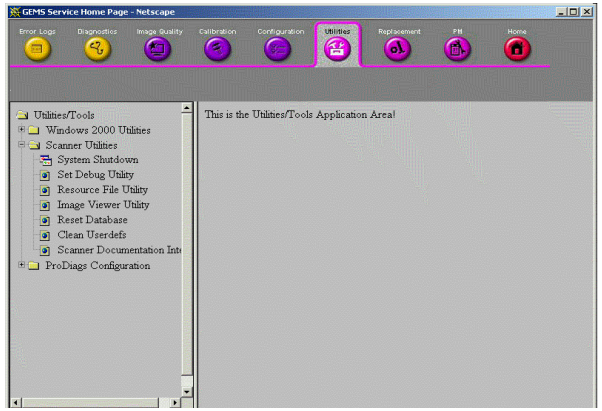
Accessing Documentation on the Ultrasound Scanner Via the CD-ROM

To access documentation via the CD-ROM,

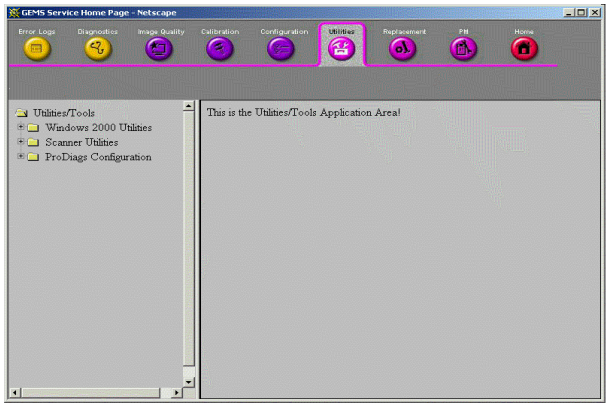
1. Logon as ‘Operator’ next to Select User Level. Enter the following password: ‘uls’. Press Okay.



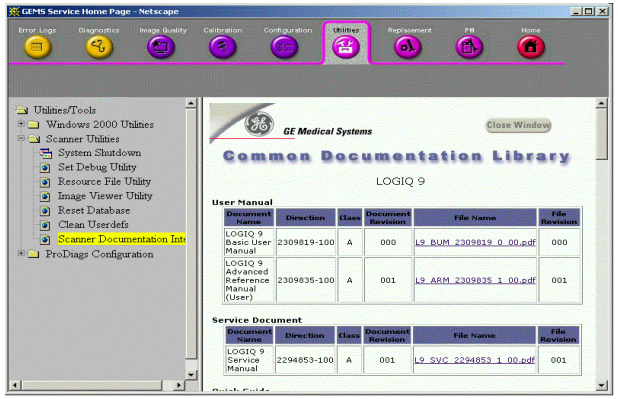
2. Press Utilities and insert the CD-ROM.



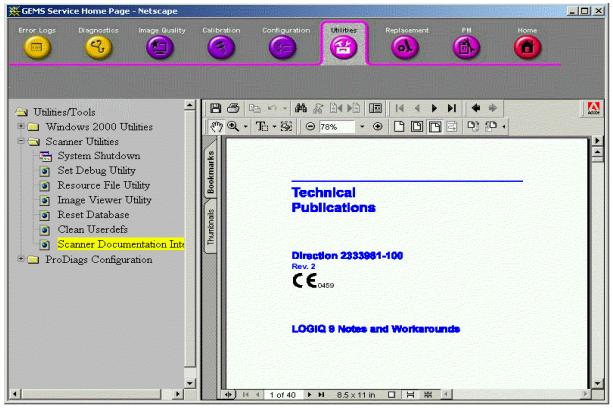
3. Select Scanner Utilities.



4. Select Scanner Documentation Interface.



5. Scroll to find the document, double click on the document, and open it.



NOTE: You can search through a document, use hyperlinks in the Table of Contents and Index to locate topics, and navigate via bookmarks.

NOTE: In addition to viewing documentation on the Ultrasound system, the Documentation CD can be read on any PC.

To exit, press the ‘X’ in the upper, right-hand corner of the documentation window.

Precaution Levels

Icon description

Various levels of safety precautions may be found on the equipment and different levels of concern are identified by one of the following flag words and icons which precede the precautionary statement .

DANGER — Indicates that a specific hazard is known to exist which through inappropriate conditions or actions will cause:

- Severe or fatal personal injury
- Substantial property damage.

WARNING — Indicates that a specific hazard is known to exist which through inappropriate conditions or actions may cause:

- Severe personal injury
- Substantial property damage.

CAUTION — Indicates that a potential hazard may exist which through inappropriate conditions or actions will or can cause:

- Minor injury
- Property damage.

NOTE: Indicates precautions or recommendations that should be used in the operation of the ultrasound system, specifically:

- Maintaining an optimum system environment
- Using this Manual
- Notes to emphasize or clarify a point.

Hazard Symbols - Icon Description

Potential hazards are indicated by the following icons:

Table 1-1: Potential Hazards

Icon	Potential Hazard	Usage	Source
Biological Hazard	• Patient/user infection due to contaminated equipment.	• Cleaning and care instructions • Sheath and glove guidelines	ISO 7000 No. 0659
Electrical Hazard	• Electrical micro-shock to patient, e.g., ventricular	• Probes • ECG • Connections to back panel	
Moving Hazard	• Console, accessories or optional storage devices that can fall on patient, user, or others. • Collision with persons or objects result in injury while maneuvering or during system transport. • Injury to user from moving the console.	• Moving • Using brakes • Transporting	
Acoustic Output Hazard	• Patient injury or tissue damage from ultrasound radiation.	• ALARA, the use of power output following the as low as reasonably achievable principle	
Explosion Hazard	• Risk of explosion if used in the presence of flammable anesthetics.	• Flammable anesthetic	
Smoke & Fire Hazard	• Patient/user injury or adverse reaction from fire or smoke. • Patient/use injury from explosion and fire.	• Replacing fuses • Outlet guidelines	

Important Safety Considerations

The following topic headings (Patient Safety, and Equipment and Personnel Safety) are intended to make the equipment user aware of particular hazards associated with the use of this equipment and the extent to which injury can occur if precautions are not observed. Additional precautions may be provided throughout the manual.

CAUTION Improper use can result in serious injury. The user must be thoroughly familiar with the instructions and potential hazards involving ultrasound examination before attempting to use the device. Training assistance is available from GE Medical Systems if needed.

The equipment user is obligated to be familiar with these concerns and avoid conditions that could result in injury.

Patient Safety

Related Hazards

WARNING The concerns listed can seriously affect the safety of patients undergoing a diagnostic ultrasound examination.

Patient identification

Always include proper identification with all patient data and verify the accuracy of the patient's name or ID numbers when entering such data. Make sure correct patient ID is provided on all recorded data and hard copy prints. Identification errors could result in an incorrect diagnosis.

Diagnostic information

Equipment malfunction or incorrect settings can result in measurement errors or failure to detect details within the image. The equipment user must become thoroughly familiar with the equipment operation in order to optimize its performance and recognize possible malfunctions. Applications training is available through the local GE representative. Added confidence in the equipment operation can be gained by establishing a quality assurance program.

CAUTION The system’s acoustic output remains transmitting when the user controls are being used. Allowing the system to transmit acoustic output with the probe not in use (or in its holder) can cause the probe to build up heat. Always turn off acoustic output or freeze the image when not in use.

Related Hazards (continued)

Mechanical hazards

The use of damaged probes or improper use and manipulation of intracavity probes can result in injury or increased risk of infection. Inspect probes often for sharp, pointed, or rough surface damage that could cause injury or tear protective barriers. Never use excessive force when manipulating intracavity probes. Become familiar with all instructions and precautions provided with special purpose probes.

Electrical Hazard

A damaged probe can also increase the risk of electric shock if conductive solutions come in contact with internal live parts. Inspect probes often for cracks or openings in the housing and holes in and around the acoustic lens or other damage that could allow liquid entry. Become familiar with the probe's use and care precautions outlined in *Probes and Biopsy*.

CAUTION

Ultrasound transducers are sensitive instruments which can easily be damaged by rough handling. Take extra care not to drop transducers and avoid contact with sharp or abrasive surfaces. A damaged housing, lens or cable can result in patient injury or serious impairment or operation.

CAUTION

Ultrasound can produce harmful effects in tissue and potentially result in patient injury. Always minimize exposure time and keep ultrasound levels low when there is no medical benefit. Use the principle of ALARA (As Low As Reasonably Achievable), increasing output only when needed to obtain diagnostic image quality. Observe the acoustic output display and be familiar with all controls affecting the output level. See the *Bioeffects section* of the *Acoustic Output chapter* in the *Advanced Reference Manual* for more information.

CAUTION

Do not use with Defibrillator.

This equipment does not have a defibrillator approved applied part.

Training

It is recommended that all users receive proper training in applications before performing them in a clinical setting. Please contact the local GE representative for training assistance.

ALARA training is provided by GE Application Specialists. The ALARA education program for the clinical end-user covers basic ultrasound principles, possible biological effects, the derivation and meaning of the indices, ALARA principles, and examples of specific applications of the ALARA principle.

Equipment and Personnel Safety

Related Hazards

WARNING

This equipment contains dangerous voltages that are capable of serious injury or death.

If any defects are observed or malfunctions occur, stop operating the equipment and perform the proper action for the patient. Inform a qualified service person and contact a Service Representative for information.

There are no user serviceable components inside the console. Refer all servicing to qualified service personnel only.

WARNING

Only approved and recommended peripherals and accessories should be used. All peripherals and accessories must be securely mounted to the LOGIQ 9.

DANGER

The concerns listed below can seriously affect the safety of equipment and personnel during a diagnostic ultrasound examination.

Explosion Hazard

Risk of explosion if used in the presence of flammable anesthetics.

Electrical Hazard

To avoid injury:

- Do not remove protective covers. No user serviceable parts are inside. Refer servicing to qualified service personnel.
- To assure adequate grounding, connect the attachment plug to a reliable (hospital grade) grounding outlet.
- Never use any adaptor or converter of a three-prong-to-two-prong type to connect with a mains power plug. The protective earth connection will loosen.
- Do not place liquids on or above the console. Spilled liquid may contact live parts and increase the risk of shock.
- Plug any peripherals into the LOGIQ 9 AC power outlet.

Related Hazards (continued)

CAUTION

Do not use this equipment if a safety problem is known to exist. Have the unit repaired and performance verified by qualified service personnel before returning to use.

Smoke & Fire Hazard

The system must be supplied from an adequately rated electrical circuit. The capacity of the supply circuit must be as specified in *Chapter 3* of the *Basic User Manual*.

Biological Hazard

For patient and personnel safety, be aware of biological hazards while performing invasive procedures. To avoid the risk of disease transmission:

- Use protective barriers (gloves and probe sheaths) whenever possible. Follow sterile procedures when appropriate.
- Thoroughly clean probes and reusable accessories after each patient examination and disinfect or sterilize as needed. Refer to *Probes and Biopsy* in the *Basic User Manual* for probe use and care instructions.
- Follow all infection control policies established by your office, department or institution as they apply to personnel and equipment.

CAUTION

Contact with natural rubber latex may cause a severe anaphylactic reaction in persons sensitive to the natural latex protein. Sensitive users and patients must avoid contact with these items. Refer to package labeling to determine latex content and FDA's March 29, 1991 Medical Alert on latex products.

CAUTION

The system is equipped with an Auto Freeze feature which disables acoustic output and freezes the image when the sytem is not in use. Take care when deactivating this feature.

CAUTION

Never put any device onto the monitor.

Related Hazards (continued)

CAUTION Archived data is managed at the individual sites. Performing data backup (to any device) is recommended on a daily basis.

CAUTION Do not unpack the LOGIQ 9. This must be performed by qualified service personnel only.

CAUTION Do not use the LOGIQ 9 Ultrasound system ECG wave for diagnosis and monitoring.

Device Labels

Label Icon Description

The following table describes the purpose and location of safety labels and other important information provided on the equipment.

Table 1-2: Label Icons

Label/Icon	Purpose/Meaning	Location
Identification and Rating Plate	Manufacture's name and address Date of manufacture Model and serial numbers Electrical ratings (Volts, Amps, phase, and frequency)	See "Label Location (b)" on page 52.
Type/Class Label	Used to indicate the degree of safety or protection.	
IP Code (IPX8)	Indicates the degree of protection provided by the enclosure per IEC60 529. Can be used in operating room environment.	Foot Switch
	Type BF Applied Part (man in the box) symbol is in accordance with IEC 878-02-03.	Probe connectors and PCG connector
	Type CF Applied Part (heart in the box) symbol is in accordance with IEC 878-02-03.	ECG marked Type CF
	"ATTENTION" - Consult accompanying documents" is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label.	Various
	"CAUTION" - Dangerous voltage" (the lightning flash with arrowhead) is used to indicate electric shock hazards.	Inside of console
	"Mains OFF" indicates the power off position of the mains power breaker.	Refer to *Chapter 3* in the *Basic User Manual* for location information.
	"Mains ON" indicates the power on position of the mains power breaker.	Refer to *Chapter 3* in the *Basic User Manual* for location information.

Table 1-2: Label Icons

Label/Icon	Purpose/Meaning	Location
	“ON” indicates the power on position of the power switch. **CAUTION:** This Power Switch **DOES NOT ISOLATE** Mains Supply. “Standby” indicates the power standby position of the power switch. **CAUTION:** This Power Switch **DOES NOT ISOLATE** Mains Supply.	Refer to *Chapter 3* in the *Basic User Manual* for location information.
	“Protective Earth” indicates the protective earth (grounding) terminal.	Internal
	“Equipotentiality” indicates the terminal to be used for connecting equipotential conductors when interconnecting (grounding) with other equipment.	Rear of console

Classifications

Type of protection against electric shock

Class I Equipment (*1)

Degree of protection against electric shock

Type BF Applied part (*2) (for PCG, Probes marked with BF symbol)

Type CF Applied part (*3) (for ECG, Probes marked with CF symbol)

Continuous Operation

System is Ordinary Equipment (IPX0)

Footswitch is IPX8

*1. Class I EQUIPMENT

EQUIPMENT in which protection against electric shock does not rely on BASIC INSULATION only, but includes an earth ground. This additional safety precaution prevents exposed metal parts from becoming LIVE in the event of an insulation failure.

*2. Type BF APPLIED PART

TYPE BF APPLIED PART providing a specified degree of protection against electric shock, with particular regard to allowable LEAKAGE CURRENT.

Table 1-3: Type BF Equipment

	Normal Mode	Single fault condition
Patient leakage current	Less than 100 microA	Less than 500 microA

*3. Type CF APPLIED PART

Type CF Applied Part providing a degree of protection higher than that for TYPE BF Applied Part against electric shock particularly regarding allowable LEAKAGE CURRENTS.

Table 1-4: Type CF Equipment

	Normal Mode	Single fault condition
Patient leakage current	Less than 10 microA	Less than 50 microA

EMC (Electromagnetic Compatibility)

NOTE: This equipment generates, uses and can radiate radio frequency energy. The equipment may cause radio frequency interference to other medical and non-medical devices and radio communications. To provide reasonable protection against such interference, this product complies with emissions limits for a Group 1, Class A Medical Devices Directive as stated in EN 60601-1-2. However, there is no guarantee that interference will not occur in a particular installation.

NOTE: If this equipment is found to cause interference (which may be determined by turning the equipment on and off), the user (or qualified service personnel) should attempt to correct the problem by one or more of the following measure(s):

- *reorient or relocate the affected device(s)*
- *increase the separation between the equipment and the affected device*
- *power the equipment from a source different from that of the affected device*
- *consult the point of purchase or service representative for further suggestions.*

NOTE: The manufacturer is not responsible for any interference caused by using other than recommended interconnect cables or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the users' authority to operate the equipment.

NOTE: To comply with the regulations on electromagnetic interference for a Class A FCC Device, all interconnect cables to peripheral devices must be shielded and properly grounded. Use of cables not properly shielded and grounded may result in the equipment causing radio frequency interference in violation of the FCC regulations.

NOTE: Do not use devices which intentionally transmit RF Signals (cellular phones, transceivers, or radio-controlled products) in the vicinity of the equipment as it may cause performance outside the published specifications. Keep the power to these types of devices turned off when near this equipment.

The medical staff in charge of this equipment is required to instruct technicians, patients, and other people who maybe around this equipment to fully comply with the above requirement.

(continued)

EMC Performance

All types of electronic equipment may characteristically cause electromagnetic interference with other equipment, either transmitted through air or connecting cables. The term EMC (Electromagnetic Compatibility) indicates the capability of equipment to curb electromagnetic influence from other equipment and at the same time not affect other equipment with similar electromagnetic radiation from itself.

Proper installation following the service manual is required in order to achieve the full EMC performance of the product.

The product must be installed as stipulated in 4.2, Notice upon Installation of Product.

In case of issues related to EMC, please call your service personnel.

The manufacturer is not responsible for any interference caused by using other than recommended interconnect cables or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the users' authority to operate the equipment.

CAUTION

Do not use devices which intentionally transmit RF signals (cellular phones, transceivers, or radio controlled products) in the vicinity of this equipment as it may cause performance outside the published specifications. Keep the power to these type devices turned off when near this equipment.

Keep power to these devices turned off when near this equipment.

Medical staff in charge of this equipment is required to instruct technicians, patients and other people who may be around this equipment to fully comply with the above regulation.

Portable and mobile radio communications equipment (e.g. two-way radio, cellular/cordless telephones, wireless computer networks) should be used no closer to any part of this system, including cables, than determined according to the following method:

Table 1-5: Portable and mobile radio communications equipment distance requirements

Frequency Range:	**150 kHz - 80 MHz**	**80 MHz - 800 MHz**	**800 MHz - 2.5 GHz**
Calculation Method:	d=[3.5/V_1] square root of P	d = [3.5/E_1] square root of P	d = [7/E_1] square root of P
Where: d= separation distance in meters, P = rated power of the transmitter, V_1=compliance value for conducted RF, E_1 = compliance value for radiated RF			
If the maximum transmitter power in watts is rated	**The separation distance in meters should be**		
5	2.6	2.6	5.2
20	5.2	5.2	10.5
100	12.0	12.0	24.0

Notice upon Installation of Product

Separation distance and effect from fixed radio communications equipment: field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast, and TV broadcast transmitter cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the ultrasound system is used exceeds the applicable RF compliance level as stated in the immunity declaration, the ultrasound system should be observed to verify normal operation. If abnormal operation is observed, additional measures may be necessary, such as re-orienting or relocating the ultrasound system or using an RF shielded examination room may be necessary.

1. Use either power supply cords provided by GE Medical Systems or ones designated by GE Medical Systems. Products equipped with a power source plug should be plugged into the fixed power socket which has the protective grounding conductor. Never use any adaptor or converter to connect with a power source plug (i.e. three-prong-to-two-prong converter).
2. Locate the equipment as far away as possible from other electronic equipment.
3. Be sure to use only the cables provided by or designated by GE Medical Systems. Connect these cables following the installation procedures (i.e. wire power cables separately from signal cables).
4. Lay out the main equipment and other peripherals following the installation procedures described in the Option Installation manuals.

General Notice

1. Designation of Peripheral Equipment Connectable to This Product.

   The equipment indicated on *Chapter 15* of the *Basic User Manual* can be hooked up to the product without compromising its EMC performance.

   Avoid using equipment not designated in the list. Failure to comply with this instruction may result in poor EMC performance of the product.
2. Notice against User Modification

   The user should never modify this product. User modifications may cause degradation in EMC performance.

   Modification of the product includes changes in:

   a. Cables (length, material, wiring, etc.)
   b. System installation/layout
   c. System configuration/components
   d. Securing system parts (cover open/close, cover screwing)
3. Operate the system with all covers closed. If a cover is opened for some reason, be sure to shut it before starting/resuming operation.
4. Operating the system with any cover open may affect EMC performance.

Peripheral Update for EC countries

The following is intended to provide the users in EC countries with updated information concerning the connection of the LOGIQ 9 to image recording and other devices or communication networks.

The LOGIQ 9 has been verified for overall safety, compatibility and compliance with the following on-board image recording devices:

- Sony UP 895 MDW B&W Video Printer
- Sony UP-21 MD Color Video Printer
- Sony UP-51MDU Color Video Printer
- Mitsubishi 91W Color Video Printer
- Sony SVO-9500 MD2 S-VHS Video Cassette Recorder\
- Sony UP-D895 B&W Digital Printer
- Sony UP-D21MD Color Digital Printer

The LOGIQ 9 has also been verified for compatibility, and compliance for connection to a local area network (LAN) via the rear panel Ethernet connection, provided the LAN components are IEC/EN 60950 compliant.

Connection may also be made to a CE Marked and IEC/EN 60950 compliant modem using one of the serial ports at the rear panel.

The LOGIQ 9 may also be used safely while connected to devices other than those recommended above if the devices and their specifications, installation, and interconnection with the system conform to the requirements of IEC/EN 60601-1-1.

General precautions for installing an alternate on-board device would include:

1. The added device must have appropriate safety standard conformance and CE Marking.
2. The total power consumption of the added devices, which connect to the LOGIQ 9 and are used simultaneously, must be less than or equal to the rated supply of the LOGIQ 9.
3. There must be adequate heat dissipation and ventilation to prevent overheating of the device.
4. There must be adequate mechanical mounting of the device and stability of the combination.
5. Risk and leakage current of the combination must comply with IEC/EN 60601-1.
6. Electromagnetic emissions and immunity of the combination must conform to IEC/EN 60601-1-2.

Peripheral Update for EC countries (continued)

General precautions for installing an alternate off-board, remote device or a network would include:

1. The added device(s) must have appropriate safety standard conformance and CE Marking.
2. The added device(s) must be used for their intended purpose having a compatible interface.
3. Signal or mains isolation devices and additional protective earth may be needed to assure compliance with IEC/EN 60601-1-1.

CAUTION The connection of equipment or transmission networks other than as specified in the user instructions can result in an electric shock hazard or equipment malfunction. Substitute or alternate equipment and connections requires verification of compatibility and conformity to IEC/EN 60601-1-1 by the installer. Equipment modifications and possible resulting malfunctions and electromagnetic interference are the responsibility of the owner.

Declaration of Emissions

This system is suitable for use in the following environment. The user must assure that it is used only in the electromagnetic environment as specified.

Table 1-6: Declaration of Emissions

Emission Type	Compliance	Electromagnetic Environment
CISPR 11 RF Emissions	Group 1 Class A	This system uses RF energy only for its internal function. Therefore, RF emissions are very low and are not likely to cause any interference in nearby electronic equipment. It is suitable for use in all establishments, other than domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes. Note: Select only one underlined word(s) according to CISPR Class A/B.

Declaration of Immunity

This system is suitable for use in the following environment. The user must assure that the system is used according to the specified guidance and only in the electromagnetic environment listed.

Table 1-7: Declaration of Immunity

Immunity Type	Test Level	Compliance	EMC Environment and Guidance
IEC 61000-4-2 Static discharge (ESD)	± 8 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%. Mains power quality should be that of a typical commercial and/or hospital environment. If the user requires continued operation during power mains interruptions, it is recommended that the system be powered from an uninterruptable power source (UPS). NOTE: UT is the a.c. mains voltage prior to application of the test level. Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial and/or hospital environment. Separation distance to radio communication equipment must be maintained according to the Table 1-5 on page 42. Interference may occur in the vicinity of equipment marked with the symbol
IEC 61000-4-4 Electrical fast transient/burst	± 1.5 kV for mains	± 2 kV for mains ± 1 kV for SIP/SOP	
IEC 61000-4-5 Surge Immunity	± 1.5 kV differential ± 2.5 kV common	± 1 kV differential ± 2 kV common	
IEC 61000-4-11 Voltage dips, short interruptions and voltage variations on mains supply	< 5% U_T (> 95% dip) for 0.5 cycle;	< 5% U_T (> 95% dip) for 0.5 cycle; 40% U_T (60% dip) for 5 cycles; 70% U_T (30% dip) for 25 cycles; < 5% U_T (>95% dip) for 5 sec	
IEC 61000-4-8 Power frequency (50/60 Hz) magnetic field	TBD	3 A/m	
IEC 61000-4-6 Conducted RF	TBD	3 V_{RMS} 150 kHz - 80 MHz	
IEC 61000-4-3 Radiated RF	3 V/m 80 MHz - 2.5 GHz	3 V/m 80 MHz - 2.5 GHz	
NOTE: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.			

Patient Environmental Devices

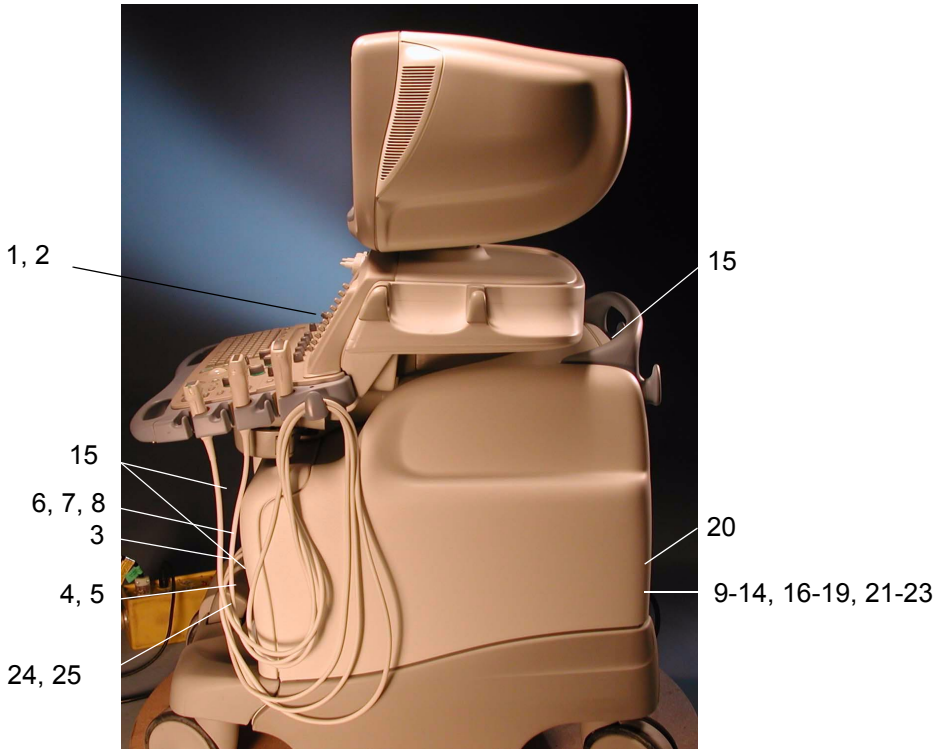


Figure 1-1. Patient Environmental Devices

1. Peripheral Device (Signals I/O Port, Power In)
2. Front Panel (Signal I/O Port, Power Out)
3. Non-Imaging Probes
4. Imaging Probes
5. Probe Port
6. ECG Cable
7. PCG Sensor
8. Physio-Signal Input Panel
9. Rear Panel
10. Signals I/O Port
11. Power Out
12. Signals I/O Port
13. Footswitch Connector
14. Power In
15. Peripheral Devices
16. Signals I/O Port
17. Power In
18. InSite Modem (Signal I/O Port)
19. Power Telephone Line
20. Footswitch
21. Power Line (AC~)
22. Ground Line
23. Power Cable with Protective Earth
24. MO Drive
25. CD-RW

Acceptable Devices

The devices shown in “Patient Environmental Devices” on page 1-47 are specified to be suitable for use within the PATIENT ENVIRONMENT.

CAUTION DO NOT connect any probes or accessories without approval by GE within the PATIENT ENVIRONMENT.

See “Peripheral Update for EC countries” on page 44.

Unapproved Devices

CAUTION Unapproved devices shall not be used in the patient environment.

If devices are connected without the approval of GE, the warranty will be INVALID.

Any device connected to the LOGIQ 9 must conform to one or more of the requirements listed below:

1. IEC standard or equivalent standards appropriate to devices.
2. The devices shall be connected to PROTECTIVE EARTH (GROUND).

Accessories, Options, Supplies

CAUTION Unsafe operation or malfunction may result. Use only the accessories, options and supplies approved or recommended in these instructions for use.

Acoustic Output

Located on the upper right section of the system display monitor, the acoustic output display provides the operator with real-time indication of acoustic levels being generated by the system. See the *Acoustic Output chapter* in the *Advanced Reference Manual* for more information. This display is based on NEMA/AIUM Standards for Real-time Display of Thermal and Mechanic Acoustic Output Indices on Diagnostic Ultrasound Equipment.

Acoustic Output Display Specifications

The display consists of three parts: Thermal Index (TI), Mechanical Index (MI), and a relative Acoustic Output (AO) value. Although not part of the NEMA/AIUM standard, the AO value informs the user of where the system is operating within the range of available output. Depending on the examination and type of tissue involved, the TI parameter will be one of three types:

- **Soft Tissue Thermal Index (TIS)**. Used when imaging soft tissue only, it provides an estimate of potential temperature increase in soft tissue.
- **Bone Thermal Index (TIB)**. Used when bone is near the focus of the image as in the third trimester OB examination, it provides an estimate of potential temperature increase in the bone or adjacent soft tissue.
- **Cranial Bone Thermal Index (TIC)**. Used when bone is near the skin surface as in transcranial examination, it provides an estimate of potential temperature increase in the bone or adjacent soft tissue.

The TI and MI is displayed at all times. The MI and TI displays start at a value of 0.0 and increments in steps of 0.1. Display precision is ± 0.1, and accuracy is ± 50%.

Controls Affecting Output

The potential for producing mechanical bioeffects (MI) or thermal bioeffects (TI) can be influenced by certain controls.

The Acoustic Output control has the most significant effect on Acoustic Output.

Indirect effects may occur when adjusting other controls. Controls that can influence MI and TI are detailed under the Bioeffects portion of each control in the *Modes chapter* of the *Basic User Manual*.

Always observe the acoustic output display for possible effects.

Best practices while scanning

HINTS

Raise the Acoustic Output only after attempting image optimization with controls that have no effect on Acoustic Output, such as Gain and TGC.

NOTE: Refer to the Optimization sections of the Modes chapter for a complete discussion of each control.

WARNING

Be sure to have read and understood control explanations for each Mode used before attempting to adjust the Acoustic Output control or any control that can effect Acoustic Output.

Acoustic Output Hazard

Use the minimum necessary acoustic output to get the best diagnostic image or measurement during an examination. Begin the exam with the probe that provides an optimum focal depth and penetration.

Acoustic Output Default Levels

In order to assure that an exam may not start at a high output level, the LOGIQ 9 may initiate scanning at a reduced default output level. This reduced level is preset programmable and depends upon the exam category and probe selected. It takes effect when the system is powered on or ***New Patient*** is selected.

Warning Label Locations

Console Labels

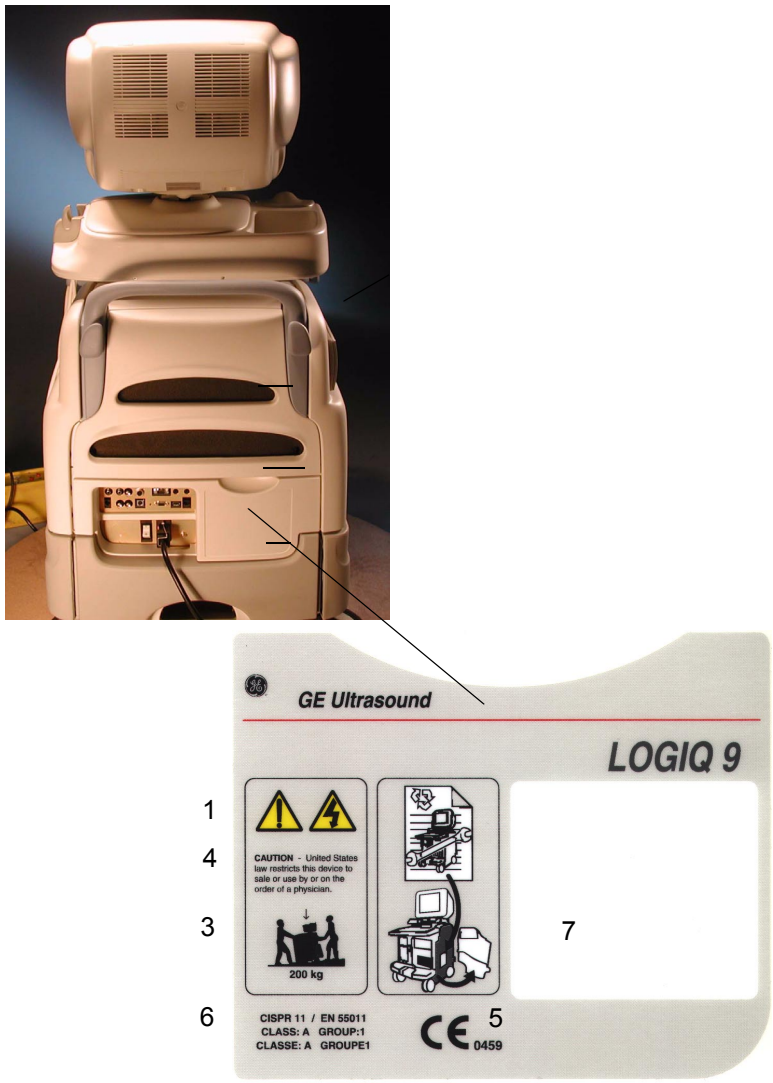
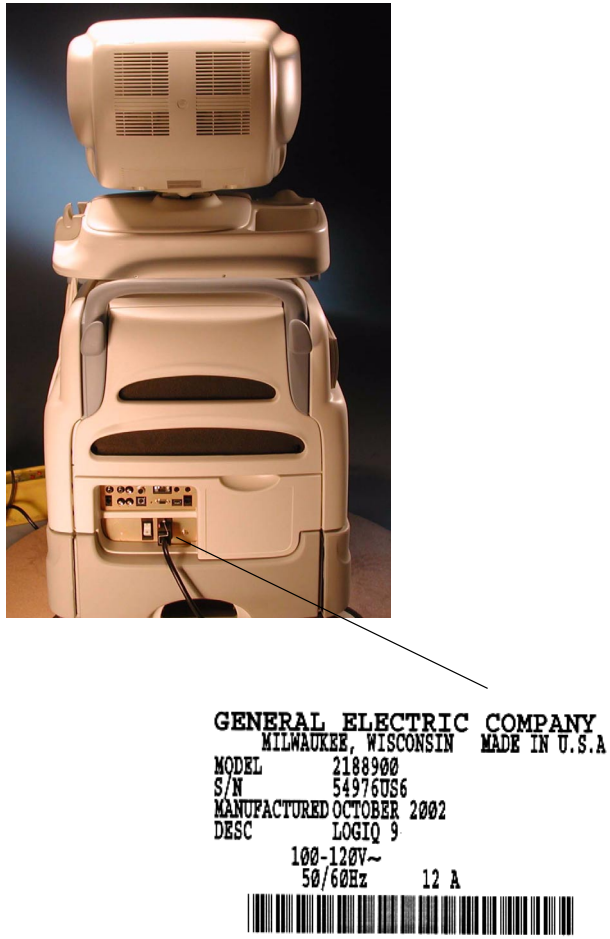


Table 1-8: Label Location Explanations

1. Possible shock hazard. Do not remove covers or panels. No user serviceable parts are inside. Refer servicing to qualified service personnel.
2. Do not use the following devices near this equipment: cellular phone, radio receiver, mobile radio transimitter, radio controlled toy, etc. Use of these devices near this equipment could cause this equipment to perform outside the published specifications. Keep power to these devices turned off when near this equipment.
3. The equipment weighs approximately 200 kg (496 lbs). To avoid possible injury and equipment damage when transporting from one area of use to another:
   - Be sure the pathway is clear
   - Limit movement to a slow careful walk.
   - Use two or more persons to move the equipment on inclines or long distance.
4. Prescription Device (For U.S.A. Only)
5. The CE Mark of Conformity indicates this equipment conforms with the Council Directive 93/42/EEC.
6. CISPR
   CAUTION: The LOGIQ 9 conforms to the CISPR11, Group 1, Class A of the international standard for Electromagnetic disturbance characteristics.
7. Electrical Ratings (Indication label)
8. Grounding reliability can only be achieved when this equipment is connected to a receptacle marked “Hospital Only” or “Hospital Grade”.(For U.S.A., Canada, Japan)

Figure 1-2. Label Location (a)

Console Labels (continued)



1.ETL Label: NRTL Listing and Certification Mark is used to designate conformance to nationally recognized product safety standards. The Mark bears the name and/or logo of the testing laboratory, product category, safety standard to which conformity is assessed, and a control number.
2.Identification and Rating Plate–USA/Asia 120V Console
3.Identification and Rating Plate–Europe/Asia/USA 220V Console
4.Identification and Rating Plate–Japan 120V Console

Figure 1-3. Label Location (b)

Fax Back Form

You can order printed documentation by faxing this form to Coakley-Tech.

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Customer Name	Telephone Number	Mailing Address

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	Advanced Reference Manual	2309835-100
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Coakley-Tech	(414) 389-9130	Norm Keene

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